

Sportsman's Handbook

COLLECTING



PRESERVING TROPHIES

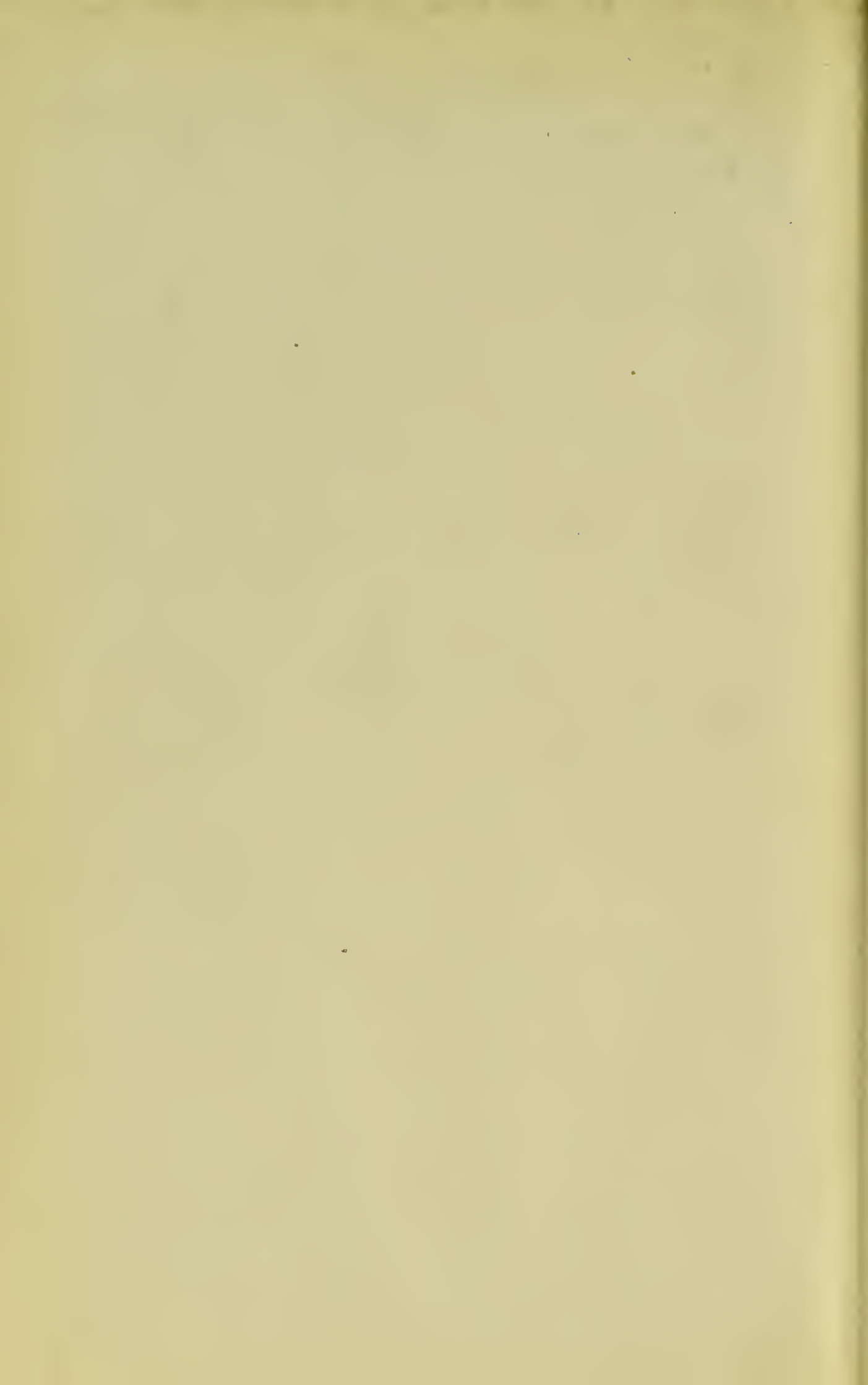
by

Roland Ward, F.Z.S.



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THE SPORTSMAN'S HANDBOOK



Your faithful servant
Rowland Ward

Hodges & Pheasant

RD. 130,751

PHOTO 1894

THE
SPORTSMAN'S HANDBOOK

TO
COLLECTING, PRESERVING, AND SETTING-UP

TROPHIES & SPECIMENS

TOGETHER WITH
A GUIDE TO THE HUNTING GROUNDS OF THE WORLD

BY
ROWLAND WARD, F.Z.S.

AUTHOR OF "RECORDS OF BIG GAME," ETC.

*TENTH, AND ENLARGED, EDITION
WITH NUMEROUS ILLUSTRATIONS*

LONDON
ROWLAND WARD, LIMITED

1911

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THIS BOOK IS DEDICATED TO

THE MEMORY OF

MY REVERED FATHER

HENRY WARD

WHOSE EMINENCE AS A PRACTICAL TAXIDERMIST

TRAVELLER, SPORTSMAN, AND NATURALIST

I PRIZE LIKE AN INHERITANCE, AND

AFFECTIONATELY EMULATE

ROWLAND WARD



John J. Audubon

*Copy of Agreement
between J. J. Audubon
& Henry Ward
July 26, 1831*

*Given to me by
James Audubon Esq.
at the River John Bachman
June 5 1832
Charleston
J. J.*

PHOTO OF THE AGREEMENT BETWEEN JOHN J. AUDUBON AND
HENRY WARD (FATHER OF ROWLAND WARD), DATED 1831

PREFACE TO THE TENTH EDITION

THIRTY years have elapsed since the publication of the first edition of the *Sportsman's Handbook*, and as that period has been one of great activity as regards the opening up of the world, vast changes have occurred in respect to opportunities and localities for big-game shooting. Civilisation has, for instance, invaded districts and countries where Nature had previously reigned supreme. This has been especially the case in parts of Southern and Eastern Africa, where British East Africa has been opened up and rendered thoroughly accessible to the sportsman. Alaska, again, has become a famous sporting locality, where some of the biggest game in the whole world are attainable with comparatively little difficulty ; while in Asia sportsmen have penetrated into the previously almost unknown province of Sze-chuen, and some of the adjacent districts of Tibet.

In the present edition the text has been thoroughly revised and brought up to date, with considerable expansion of the section on the "Hunting Fields of the World." All the original illustrations have been redrawn or rephotographed, and a number of new ones added.

Here I may take the opportunity of according my best thanks to Mr. Lydekker for revising and expanding the Hunting Fields section ; and likewise of expressing

my acknowledgments to Messrs. F. C. Selous and R. J. Cuninghame for valuable assistance in other parts of the work.

In this place reference may also be made to the illustration of the "McCarte Lion," which appears for



SIDE VIEW OF HEAD OF THE MCCARTE LION,
MODELLED BY ROWLAND WARD, 1874.

See page 138.

the first time in this volume. It represents the model of a wounded lion made by myself in 1874; the animal, which is supposed to have been struck by a bullet behind the shoulder, being shown in a sitting posture,

growling with rage, and on the look-out for its enemy. At the time it was made this model attracted considerable attention on the part of the public, as it represented a totally new era in taxidermy, destined to supplant the old-fashioned "stuffing" processes which up to that time had held the field.

The first large group which I modelled in the new style was a "Combat of Red Deer." This was shown in the Scientific Inventions and New Discoveries section of the London International Exhibition of 1871, and formed the subject of an article in the *Daily Telegraph* of that year, entitled "Wardian Taxidermy." In this process the animals were first modelled in a paste or cement invented by myself, which could be so manipulated as to present the natural configuration of the body, but afterwards set so solidly as to become in effect a statue. The actual skulls and limb-bones of the animals were incorporated in the model and overlaid with my composition. When the modelling of the whole group was complete, the skins were fitted on to the animals, with the aid of a fatty preparation. Further extracts from the press of 1871-6 in relation to this matter are appended later on in this volume, which afford additional information with regard to the earlier models made by this process. As evidence of its durability, it may be mentioned that the head of a heifer, "Lady Flora," modelled in 1873, was found, when examined in January, 1911, after being hung up for over thirty-seven years, to be in as perfect preservation as when first made.

This method of modelling and mounting animals, invented by myself some forty years ago, is still used at my London establishment. It has never been surpassed, and I know of no other method by

which the muscular structure of animals is so well displayed.

I refer to this subject at some length on account of the circumstance that just three years ago this method was illustrated in a London weekly journal as a new American invention ; this very same journal having about thirty-seven years previously published illustrations, with favourable comments, upon some of my earlier modellings of the same type. Nor is this all, for only last year an attempt was actually made to patent my process in India. And I think it may be safely said that so far at least as taxidermy is concerned, England has nothing to learn from America or any other country ; as a proof of which it may be mentioned that natural history specimens modelled in my studios are to be found in every civilised country of the world.

As further testimony to the same effect the following extract on the excellence of the work of English taxidermists may be quoted :—

“ The finest animal study of ancient or modern times was achieved by one of them—the ‘ Lion and Tiger Struggle,’ exhibited at Paris, and afterwards at the Sydenham Crystal Palace. This, and two analogous works, carried the English to the foremost ranks of zoological artists ; and now that we embellish our taxidermic studies with natural grasses, ferns, etc., and with representations of scenery and rock-work, in the endeavour to carry the eye and mind to the actual localities in which the various species of animals are found—an advance in art not dreamed of fifty years ago—and also to correctly model the heads and limbs of animals, we still hold our own, and are as far advanced in taxidermy as any other nation.”

Finally, it may be mentioned that since the date of publication of the first edition of this work great advances have been made in the methods of preserving specimens in the field for home shipment. Formerly it was quite common on opening cases from abroad to find their contents more or less completely ruined by the attacks of skin and fur-eating insects. Now such catastrophes are far less frequent.

ROWLAND WARD.

PICCADILLY, *April*, 1911.



“THE STRUGGLE.”

MODELLED BY THE LATE EDWIN WARD.

PREFACE TO THE FIRST EDITION

I HAVE made an endeavour, in the following pages, to present to the sportsman-naturalist some information that may be valuable to him as derived solely from *experience*—either the accumulated experience of my family, of whom I am now the only representative in our profession, or the carefully collected experience of others in those parts of the subject where my own work has not carried me. My grandfather was a practical naturalist; my father, the late Henry Ward, became eminent in the same way, but with some remarkable advantages, having travelled much in pursuit of his profession in both hemispheres, and notably as the companion of Audubon, when that distinguished man was so greatly enriching and extending the field of natural history. I have been greatly assisted by the information given me by many travellers and true sportsmen. It has been my object to avoid mere speculative opinion and to make the book as concise as might be.

It is only in comparatively recent times that taxidermy has been elevated to claim any real art position. What has been gained for it has not been achieved by mere skill, but by extended and more accurate observation of nature in its living forms—of the behaviour and habits of animals, not simply examination of their carcases, or what remained of them. Such

observation, carefully and correctly recorded, is invaluable to the naturalist who seeks, by the preservation unimpaired of the natural features of an animal, to use the verisimilitude so obtained as an aid to art illustration. The material means for such a result are indeed important ; but something more may be done with a prepared group of animals, or a single specimen, than preservation for the identification of details in anatomy or of outward appearance. Its value to the student may be preserved and increased by displaying its beauty truthfully to life, while the beauty is recognised for its own sake by even the unscientific. This is the cause I advocate, and the end I have in view.

R. W.

12th May, 1880.

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THE SPORTSMAN'S HANDBOOK

INTRODUCTORY

IN starting from England or any other country on an expedition for collecting that is likely or certain to separate him from the means and conveniences that he can command for money in settled and civilised communities, it is all-important for the explorer or the sportsman to provide himself carefully with everything he is likely to want. But it is more important still that in doing so, he should be able to define what are his real wants, and to limit the satisfaction of even these to the smallest possible proportions. He should therefore carefully consider at starting what he should take with him, since he cannot obtain it so well elsewhere; although it is not well to imagine possible difficulties or wants, and endeavour to provide for them particularly. In regard to most of the apparatus, simplicity is essential to real usefulness. Attention should be paid to appropriateness of costume, since experience has shown that in the field the entire dress should be of one colour, and that a dull tint. White should not be displayed at all, not even in the shape of a linen collar, or a pocket-handkerchief, since it is most conspicuous in a jungle. And all arrangements should be invariably made with the recollection that in this respect a small modicum of actual experience

in any country is worth any amount of speculation out of it. This observation will also apply to most of the shifts and expedients of camp-life. The carefully recorded experiences of good sportsmen, who have been in similar fields before, are of infinite value to instruct; not indeed for mere servile imitation in particulars, since conditions may entirely differ, but as exemplifying the principles on which given means are applied to definite ends. It may be added that important factors in the consideration of these questions are the strength, stature, and constitution of the sportsman himself.

RIFLES AND AMMUNITION

The progress of invention has of late years strengthened the position of the sportsman in respect of his armament, especially as regards great and dangerous game; and he has now a wide choice of excellent weapons. Nowadays, indeed, this wide field of selection has somewhat complicated the question; but in reality the conditions have not changed for the true sportsman, who seeks rather opportunities for exercise of his skill and courage than mere butchery. Indifferent ability may find compensation of a kind in the latter, but certainly not the admiration of the lover of nature and real sport. In selecting particular weapons, each one will follow his bent; but on some points there is a consensus of opinion among those best qualified to judge that should strongly influence every sportsman. It may, for instance, be admitted that in the hands of a true sportsman of fine skill the chosen weapon for dangerous game should be as light as possible in relation to his own personal strength, so that his ability to wield it easily may be without doubt. The "Express" rifle,

on account of its easy carriage and manipulation, its power for inflicting severe internal wounds, its accuracy and extended point-blank range, is all-sufficient for ordinary game ; but in all cases the weapons should be carefully suited to the sportsman's muscular power, and length of reach. This reaction in favour of a light armament has no doubt been fostered by the example of that accomplished and experienced sportsman, Mr. F. C. Selous, whose exploits among great game on the hunting-fields are perhaps unsurpassed. For many years Mr. Selous has given up the use of 4-bores and big charges for elephants and rhinoceros, and he also wishes that he had never used them, and never undergone the labour of wielding them, or encountering their inevitable recoil, the effects of which he still feels. There are, however, some sportsmen who, while fully admitting the suitability and sufficiency of the smaller bore rifles for all soft-skinned game, dispute their efficiency for the great pachyderms or even buffalo. They miss the smashing power and the paralysing effect of the heavy bores. This view has been, and still is, that of some fine sportsmen ; but to what degree it may be the result of tradition, and of practical experience in conditions that are past, enters very largely into the question. Certain it is, that with an 8-bore Double and a .577 and .450 "Express," the heaviest bags of the great pachyderms were made a good many years since in East Africa ; and what is true under the conditions of that continent is also true in the Indian jungles. Sometimes mere theory may obscure the question, and accidental practice prove the point. Mr. Selous, for instance, when feeling weak after an illness, took out his lighter weapon, simply because it was the only one he could wield ; and with it he killed five elephants

in succession, thus demonstrating what was till then a mere speculation. The magnificent skill of this great hunter may well be taken as a modifying circumstance in any consideration of this question, and individual aptitude must govern the decision. Personally I am convinced that the reaction against weapons of very heavy calibre is a step in the right direction, and that it is an increasing movement which, when combined with personal skill, will probably gain yet more impetus in the future.

In this connection I may quote two communications with which I have been favoured by Mr. Selous, in the first of which, dated August 23rd, 1905, he wrote as follows :—

“ More than five years have passed since I wrote you a few notes on the subject of rifles in March, 1900, and the experience I have gained in the meantime has only confirmed the views which I then ventured to express. In 1900 I wrote : ‘ I am so much a believer in small-bore rifles that I fully expect to see the large-bore weapons and heavy charges of powder, still clung to by some old shikaris, entirely discarded by the coming generation of big-game hunters, who will probably find the new .450 bore rifles shooting cordite and a solid .480 grain nickel-covered projectile quite powerful enough to kill both buffaloes and elephants with body-shots.’ These anticipations have, I think, been fully realised both in North America and in Africa, though possibly there are still sportsmen who consider that large-bore rifles shooting black powder and a heavy spherical bullet are the most suitable weapons for use against powerful and dangerous beasts in the dense jungles of Assam and other parts of the

East. I know that there are some American amateur sportsmen who believe that small-bore rifles are not always to be depended on against animals so tenacious of life as bears and moose. However, when hunting in the Yukon Territory in 1904, I found that all the professional trappers and meat-hunters whom I met were armed with small-bore cordite-shooting rifles, with which they said they were able to kill moose and bears without difficulty, and of the seven moose I have myself killed, which is all I have ever fired at, I killed two with a .303 bore rifle, and the other five with a .375 bore.

“When in East Africa, too, in 1902, Mr. A. H. Neumann, who is probably the most experienced elephant-hunter now living, assured me that the double .450 bore cordite-rifle he had lately been using was by far the most effective weapon against these huge animals that he ever possessed.

“Personally, I consider that the clumsy old 4 and 8 bore rifles shooting enormous charges of black powder are out of date, as it appears to me to be very doubtful if they possess any advantages over cordite rifles of .450 and .600 bore in the matter of killing and stopping the charges of large animals, whilst their weight and heavy recoil put them at a great disadvantage when compared with the far lighter and handier modern weapons.”

In his second letter, dated January 22nd, 1911, Mr. Selous wrote in the following terms:—

“I have looked through the letter I wrote you on the subject of rifles in 1905, at which date I was accustomed to consider all cordite rifles of whatever

calibre they might be, as small bores compared with the heavy old 4-bore weapons I once had to use. But as such old-time rifles or smooth-bore guns, shooting black powder and heavy spherical bullets have become entirely obsolete, and only cordite rifles are now used by modern sportsmen, what is to-day understood by a heavy rifle is any weapon of a larger calibre than $\cdot 400$; the small bores ranging from $\cdot 256$ to $\cdot 310$, whilst such rifles as the $\cdot 350$ and the $\cdot 375$ bore may be looked upon as of medium size.

“ One is often asked what is the best all-round weapon for African game, which is a very difficult question to answer, for although there can be no doubt that the heaviest of African game, such as elephants, rhinoceroses, and buffaloes can be, and have been killed, not only with brain-shots, but also with heart-shots from very small-bore cordite rifles, whilst on the other hand the smallest antelopes can be killed with the most powerful of such weapons, yet it cannot be said that there is any one rifle which under all sorts of conditions is the best for all kinds of African game.”

Mr. Selous continues his letter in the following terms :—

“ The best weapon for elephants and buffaloes, which are usually met with in dense jungle or bamboo forest, where it may be impossible to obtain a picked shot, is the heaviest cordite rifle a man can use with ease and comfort. For a man of medium weight and build, a $\cdot 450$ or $\cdot 470$ bore is quite heavy enough, as a double $\cdot 450$ by a good English gun-maker is a very powerful weapon ; but, of course, a $\cdot 577$ or $\cdot 600$ bore rifle would carry a heavier bullet and possess greater striking energy, and in the hands of men strong enough

to use them easily, such rifles should give better results than anything smaller. It is, however, a great mistake for any man to attempt to shoot with a rifle which is too heavy for him to handle easily or the recoil from which is likely to upset his shooting.

“ Having purchased a suitable cordite rifle of one of the heavier bores with which to tackle the heaviest species of game at close quarters and probably in thick bush, the sportsman’s next concern will be to obtain a really good small-bore rifle, for everyday shooting in open country. The choice of a suitable weapon for this class of sport has until recently lain between such rifles as the .256, the .303, and the .310 (the German 8 mm. Mannlicher). All these rifles are extremely accurate and wonderfully effective, considering the small size of the bullets they carry, and all of them have a low trajectory. Good as they are, however, it seems likely that they will be superseded by small-bore rifles of various patterns carrying pointed bullets, which I believe are a German invention. When shooting in Africa in 1909, ex-President Roosevelt shot a great deal of game with an American ‘Springfield’ rifle of very small bore (about .280, I believe) carrying a pointed bullet. He only used solid bullets, but he assured me that no form of expanding bullet he had ever seen in action was anything like so deadly as these solid, pointed projectiles, which he was inclined to think must turn over and over while passing through an animal, thus making terrible wounds. As the muzzle-velocity of these ‘Springfield’ rifles is very high, they have a low trajectory, and are therefore very suitable for use on bare open plains where game cannot be closely approached.

“ Another rifle which is, I believe, very similar to

the 'Springfield,' is the Canadian 'Ross.' These little rifles of .280 bore, and shooting pointed bullets, have already been used with great success by a few English sportsmen, and can be obtained in this country.

"In addition to the two small-bore rifles just mentioned, the 'Ross' and the 'Springfield,' which shoot pointed bullets, I believe that others are now obtainable. I know that one firm has lately perfected a .275 bore rifle of this description, and probably other well-known rifle-manufacturers have been experimenting in the same direction. No sportsman about to proceed to Africa should buy a small-bore rifle without first having made full enquiries as to the merits of these new types; and although I have not yet had the opportunity of using one myself, all that I have heard from men who have, leads me to believe that they will be the favourite small-bore weapons of the future."

Mr. R. J. Cuninghame, who accompanied the Roosevelt Expedition to East Africa, has also favoured me with some interesting notes on rifles and ammunition, with special reference to pointed bullets; from which I make the following extract:—

"During the Roosevelt Expedition I had ample opportunities of observing the effect of the pointed bullet. The rifle used by ex-President Roosevelt was not a 'Ross,' but an Army American 'Springfield,' firing a very sharp, solid bullet. The trajectory is extremely flat, and the smashing power on such game as antelopes was quite remarkable. I was so much impressed with its effectiveness that I intend giving this pointed bullet a trial. I do not consider, at present, that it is of much real service against pachyderms and buffalo, but as a

small-bore rifle it seems to promise considerable advantages."

In this book, however, it is not my purpose to promote discussion, but rather, in a matter of such complex consideration, to offer my own judgment, based on such experience as I possess, and backed up by the views of expert sportsmen like the two just quoted.

In regard to the .303 bore, it may be noted that, according to information, the Government of India, some years ago, placed a prohibition on the importation of all rifles capable of being used with Government service ammunition of whatever bore, namely, .303, .577/.450, or .577 bores; the prohibition also extending to ammunition for such rifles. Although there are certain exceptions to a limited number of persons, it behoves the would-be purchaser to bear this order in mind, not only for India, but for other parts of the Empire, in case the order should be extended.

From the above it will be manifest that details have much to do with success, and are, indeed, in certain cases absolutely essential. Among such details are the temper (hardness) of the bullet and the amount of the charge of powder. Experience on the field is, however, the only true guide, and experiments are only valuable according to the conditions. Although sportsmen among great game may have had to use such weapons as happened to be available—in some cases weapons that would now seem quite primitive in comparison with modern ones—the testing by sportsmen of such weapons in real action is the only true one; indeed, eye and hand, as confident agents of skilful judgment, are as important factors in the result as

the powder that utilises the best-made missile, or the most accurate rifle. The man who can, without fail, do all that is prescribed in a gun-maker's shooting-yard, might find his calculations disturbed by the swift rush of an elephant, the deadly spring of a tiger, or the charge of a wounded buffalo.

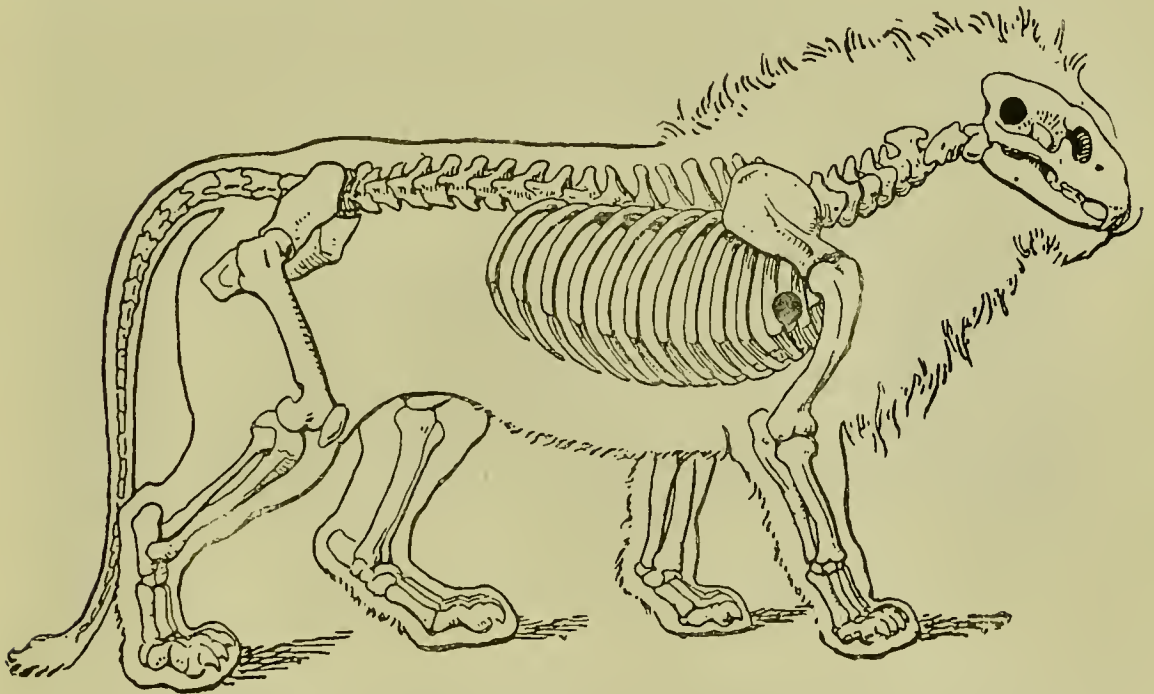


HEAD OF A LION, SHOWING THE SPOT FOR THE BRAIN-SHOT.

VITAL SHOTS

In fact, the sooner the sportsman realises that his operations with great game cannot be reduced to the regularity of a game of chess, the better will he be able to guard his own safety and succeed in whatever field he may be engaged. Nothing, indeed, in the way

of arms can be of more value to him in such circumstances than quick apprehension, delicate tact, strong, cool courage, and perfect skill in the use of his weapon. But beneath all this should lie a knowledge of what experience and investigation have shown to be the best way of attaining the desired end; and one important detail is to know *how and where it is best to strike the game in a vital part*, or in such a way that



SKELETON AND OUTLINE OF A LION, SHOWING VITAL SPOTS.

the animal may be disabled. And here it must be remarked that no amount of book-instruction will equal a small amount of experience; therefore it is well, when the game is *killed and comes to be cut up*, always to make a careful investigation as to the course of the bullet in regard to its effect on the vital parts. In order to make clear the position of these points, a few diagrams of representative species of animals are given, on which the points are indicated. Speaking

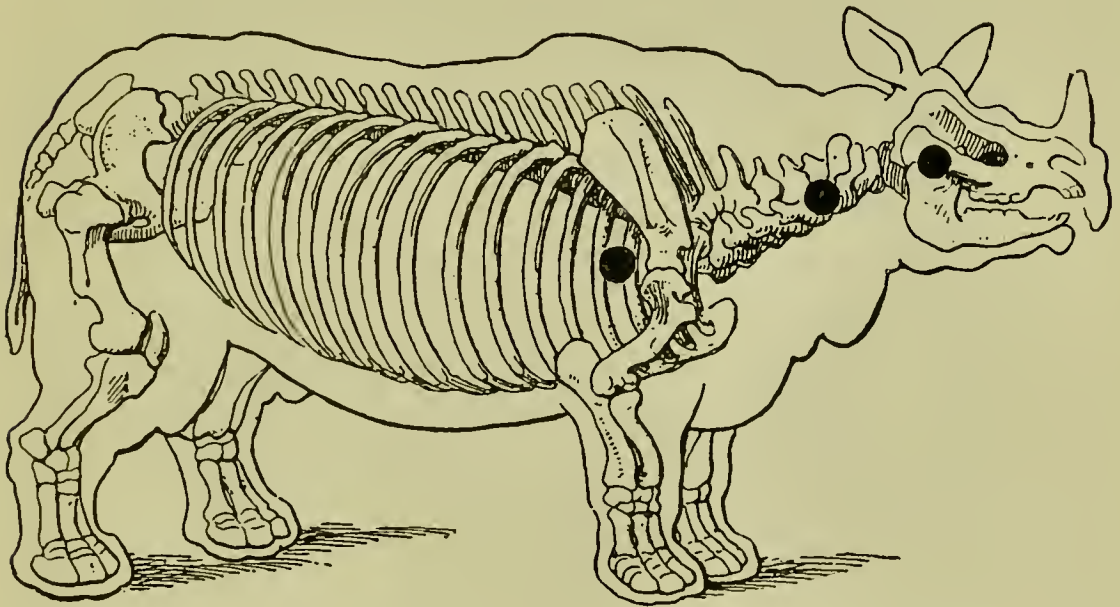
generally, it may be said that the brain and the heart are the most vital organs ; but to these must be added the spinal column. Now, with different species of animals, in diverse circumstances, the conditions under which these parts can be reached vary considerably. We may divide big-game animals into two classes : namely, those that are dangerous, and, secondly, those that are not seriously dangerous. These may again be divided into such as are in their natural condition unsuspicious, or quiescent ; and those which are furious, aggressive, and apt to charge. To speak first of the members of the cat tribe, or *Felidæ*, the place to hit a



SKETCH OF A CROUCHING LIONESS, SHOWING THE HEART-SHOT.

lion, if you are quite sure of your aim, as you may be if he is quiescent, is undoubtedly the brain. Now in a lion, and likewise in a tiger, the brain is about the size of an apple, and small in comparison to the size of the skull ; the brain-pan being situated about three or four inches to the rear of the eye (*vide* diagram). The heart is also indicated, and when the animal is broadside-on, it can be pierced by a shot behind the shoulder. When he is charging direct towards you, the best shot to deliver is a little to the right or left of the head, straight through the shoulder, for by this you may perhaps pierce the heart, or possibly fracture

the spinal cord, while the bullet may traverse the body lengthwise with paralysing effect, or it will—which is most important—shatter the shoulder-bone, and prevent the deadly spring. Rhinoceroses, on the other hand, are best killed by piercing the brain, by fracturing the spinal column in the region of the neck, or, less satisfactorily, by reaching the heart. For the brain the sportsman should aim behind the ear. The sportsman's position in regard to the animal will determine



SKELETON AND OUTLINE OF THE GREAT INDIAN RHINOCEROS,
SHOWING THREE VITAL SPOTS.

the possibility of his reaching the spinal column. The hide of the great Indian rhinoceros (*Rhinoceros unicornis*) is tougher than that of the African species, but in the living beast is easily permeable; still, where there is room for choice, it is best to shoot between the folds of the neck.

In regard to African rhinoceroses (*R. bicornis* and *R. simur*) Mr. Cuninghame states the most fatal shot is the brain-shot, and the aim should be directed to

the base of the ear (where the white mark is placed in the figure), when the animal's head is *en profile* to the shooter. The body-shot and the neck-shot are the same as in the Indian species. When the animal is standing rather sideways and facing the shooter, the correct spot at which to aim is the space between the eye and the base of the ear, but when the head



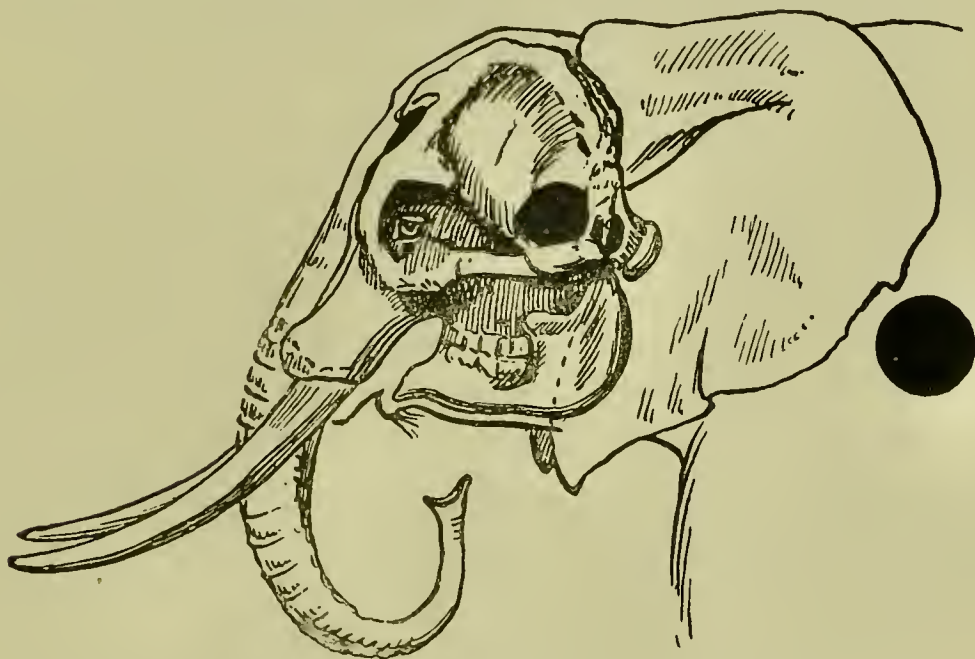
HEAD OF BLACK AFRICAN RHINOCEROS, SHOWING THE HEAD
AND THE NECK-SHOTS.

is in direct profile the base of the external ear is the brain-shot.

In certain circumstances the charge of an African buffalo or an Indian gaur is among the most dangerous experiences of the sportsman. The same general observations apply; but the neck and shoulder-shots are to be preferred.

In regard to the elephants, there is a great difference between the African (*Elephas Africanus*) and the Indian

(*E. maximus*). The skull of the first is convex in frontal form, while that of the latter is concave. The brain is wonderfully small in comparison to the mass of honeycombed bone with which it is surrounded. The average weight of an elephant's brain is about nine pounds, which is but a minute fraction of the weight of the skull. The Asiatic elephant may easily be shot dead while charging if pierced in the forehead ;



HEAD OF AFRICAN ELEPHANT, SHOWING HEAD
AND NECK-SHOTS.

but a similar shot would not be efficacious in the case of the African species. The brain of these creatures is protected by a mass of cellular bone, which cannot well be pierced by a bullet unless it be directed through the orifice of the ear. If the animal be charging towards you, the best shot is in the chest.

In connection with the African species, Mr. E. J. Cuninghame states that when the sportsman is manœuvring to obtain a fatal shot, by far the most certain

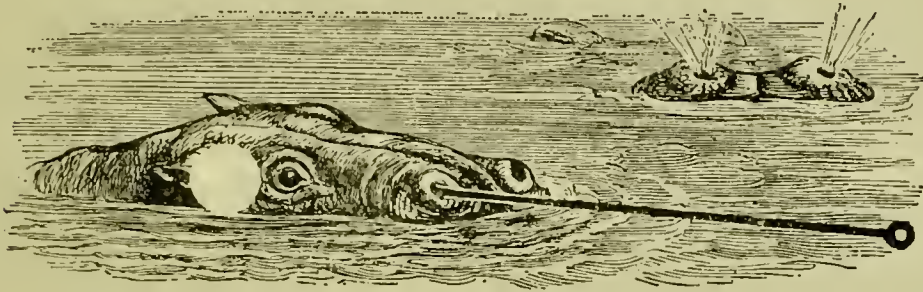
is the orifice of the ear, *if the shooter can obtain a square "profile" shot*. The external auditory orifice, some 9 inches in length, shows up as a black line, offering a definite mark, and the bullet should be placed about the centre or a trifle higher. The body-shot for the heart is not so certain for the novice, since the ears of the different races of the elephant differ markedly in size and shape; but as the heart forms so much larger a target than the brain, the general direction of "aim at the central portion of the outer edge" is a concise indication.

An elephant having received, say, a .450 solid bullet in the heart will frequently charge blindly in any direction, falling dead in from two to three hundred yards; and it often happens that when the sportsman is trying to secure the big bull of a herd a good head or body-shot is prevented, either by the proximity of its companions or by the natural surroundings. In such a case shot placed in the spine at the root of the tail brings him down at once, after which a brain or body-shot can be secured.

Before leaving the subject, it may be mentioned that the late Mr. A. H. Neumann, on page 55 of his *Elephant Shooting in East Africa* (from which the accompanying illustration is reproduced), after referring to the advantages of the head-shot, proceeds to observe that:—

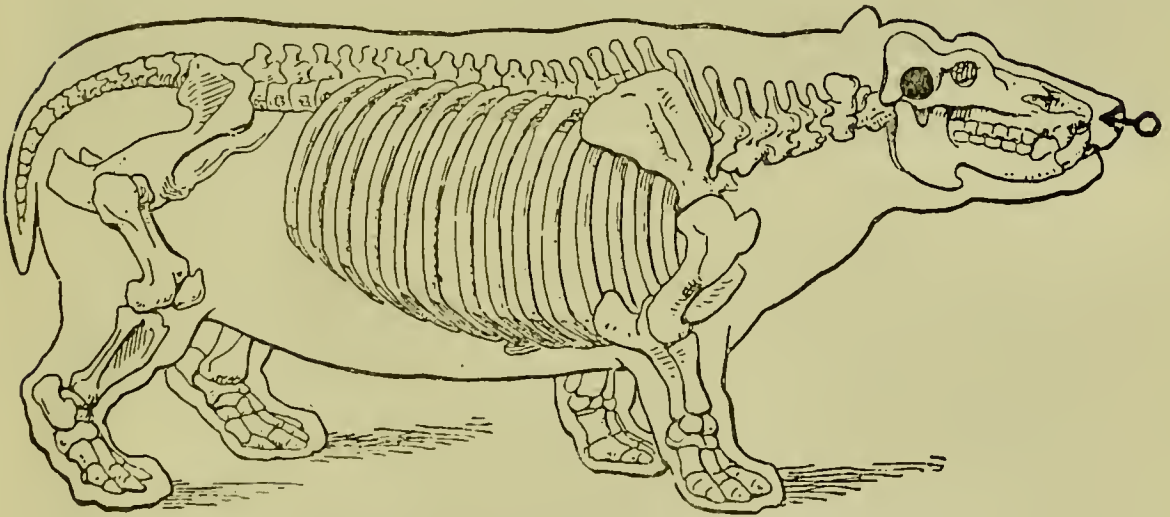
"If shot through the heart, an elephant immediately rushes off, though only for a short distance, of course scaring any others with it. I have found, however, that though one can make pretty sure of dropping a cow, if one gets a fair chance, the brain of an old bull is by no means so easily reached."

Again, Mr. Selous, on page 434 of *Travel and Adventure in South-East Africa*, in discussing the African elephant and buffalo, observes, "that it is almost impossible to kill either the one or the other



SWIMMING HIPPOPOTAMUS, SHOWING HEAD-SHOTS.

with a shot in the front of the head when charging, owing to the position in which the head is then held, though both may be easily killed by a shot in the front of the head when standing at rest."



SKELETON AND OUTLINE OF HIPPOPOTAMUS,
SHOWING HEAD-SHOTS.

Turning to hippopotamus, it may be observed that if these animals are fired at just as they rise to the surface of the water, they should receive the bullet up the nostril, as being the surest road to the brain.

When stricken, a hippopotamus sinks, and it may be an hour or two before his body rises ; the time depending greatly on the temperature of the water. If shot on the shore, the heart should be aimed at behind the shoulder, half-way up the body in the line of the leg, being the general rule.

Seals should always be shot in the head, the sportsman taking care to aim far back in the head, behind



OUTLINE OF SKULL
AND HEAD OF SEAL,
WITH POSITION OF
VITAL SPOT.

the eye, where the brain is situated, as shown in the drawing. The peculiar conditions under which seals are collected make extreme accuracy of aim important, for unless the brain is penetrated at first, the chances are that the creature plunges instantly from the ledge of ice or other vantage-place on which it most probably has been resting, and, however severely it may have been wounded, is usually lost. Too frequently numbers of these creatures are thus wasted by unskilful hunting.

APPARATUS

For collecting some small animals and birds, shot-guns of small gauge, throwing suitable shot, are requisite. A useful gun for such purposes is of $\cdot 410$ bore, with smokeless powder and No. 7 shot. If the collector wants a larger calibre for birds on the wing, a $\cdot 20$ or a $\cdot 28$ bore may be recommended.

Every sportsman and collector ought to possess a $\cdot 22$ rifle, fitted with a Lyman sight. It can be taken to pieces in a moment and put in a travelling-bag. With the new ammunition, which is smokeless and free of grease, this is a most handy weapon, and with

shot-cartridge will do all that is wanted in this country, while it would be invaluable for small mammals in other parts of the world. Dust-shot can also be used in this rifle at short range. Scarcely any noise is made ; and I have killed a lot of "stuff" with these handy little weapons without disturbing anything in the neighbourhood.

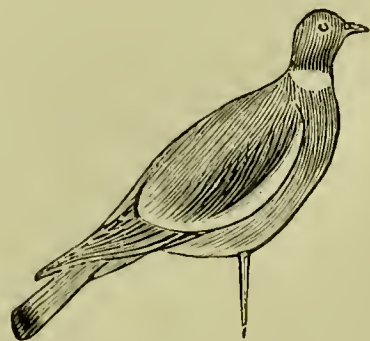
A more humble, but in its degree an equally useful implement for the collector, and one which he can employ to remarkable advantage, is the blow-pipe. The implement is so simple and so easily constructed that the price of it is inappreciable. A length of about three feet of any straight metal or wooden tubing, $\frac{3}{4}$ -inch in diameter, through which a pellet the size of a marble may be blown, will serve well, but an even longer tube may be chosen. The pellet should be of clay or putty, rolled in the hand to pass easily through the barrel without too much windage. It should not touch the mouth, but be placed lightly just in the orifice, by stopping which with the thumb the tube can be conveniently carried loaded, muzzle-upwards, ready for immediate use. To propel the pellet, the puff must be sudden and powerful ; and there is a proper way of effecting this. When a novice first begins to use the blow-pipe, it is a common error to eject the breath only direct from the lungs ; but he should acquire the habit of inflating the cheeks, so as to make a storage of wind, as it were, for each shot ; this, added to the breath from the lungs, giving a force that will sometimes astonish the beginner. The hand follows the eye in aim, and practice will often develop unthought-of proficiency. The special advantages of the blow-pipe are that its operation is silent and does not disturb, that it is effective for small and moderate-

sized birds not on the wing, that it is easily manipulated in a wood, and that it is obtainable anywhere, and the ammunition costs nothing.

The question of traps, snares, etc., is one which concerns the collector or trader rather than the sportsman. Many specimens can, of course, be collected by these means; but a man's own taste will guide him in the selection and use of such implements better than any precept or instruction. There are many ingenious devices used in America, Scandinavia, and other countries for the capture, or rather the destruction, of game of all sizes. It will be found, however, that Brailsford's traps, or perhaps even ordinary gins, of whatever size they may be made, remain the most really efficacious of all such contrivances. Implements, made on this principle, are now constructed of great power and large dimensions for the trapping of bears and other great game. In North America they can be easily applied with a certain success; but in Africa they do not work with such satisfactory results in regard to selected game. For in the latter country round every camp or centre that has attractions for wild life, in overwhelming proportion to the animals of which the sportsman is in quest, come the scavenging hyænas and other vermin, and the chance is that they occupy the carefully set gin before it can close on the game for which it was intended. Although circumstances may sometimes sanction the employment of such means, they are generally abhorrent to the true sportsman.

The employment of dummies and decoys for birds, and especially shore-birds, is both interesting and useful. Probably in all parts of the world ingenuity can adapt this resource in some degree, but as a rule

gregarious birds are those most subject to fascination of this kind, for such it is in reality. To give an example in our own country—wood-pigeons may be thus attracted. Any carpenter can carve the shape of a wood-pigeon in the rough; no legs need be shaped, but a stick should project from the lower part of the breast, so that the dummy can be fixed in the ground, or placed in a tree, as may be required. The dummy must be painted in colour to represent the pigeon, and the paint must be “flatted,” that is, not glossy. Such a dummy costs only a few shillings; but in place of this, a board cut out to represent the head, tail, etc., and a body made of wood and wool will answer the purpose. Such rough models can be painted after being dressed with carboline; and it is astonishing how the wild birds will come down to their haunts when they see the dummy there to assure them. In like manner plovers, gulls, and other shore-birds may also be decoyed. The decoy-duck, made buoyant to rest on the water, is well known to all sportsmen. Truthfulness to nature in regard to action is a great point in these decoys, and of more importance than mere details of feather.

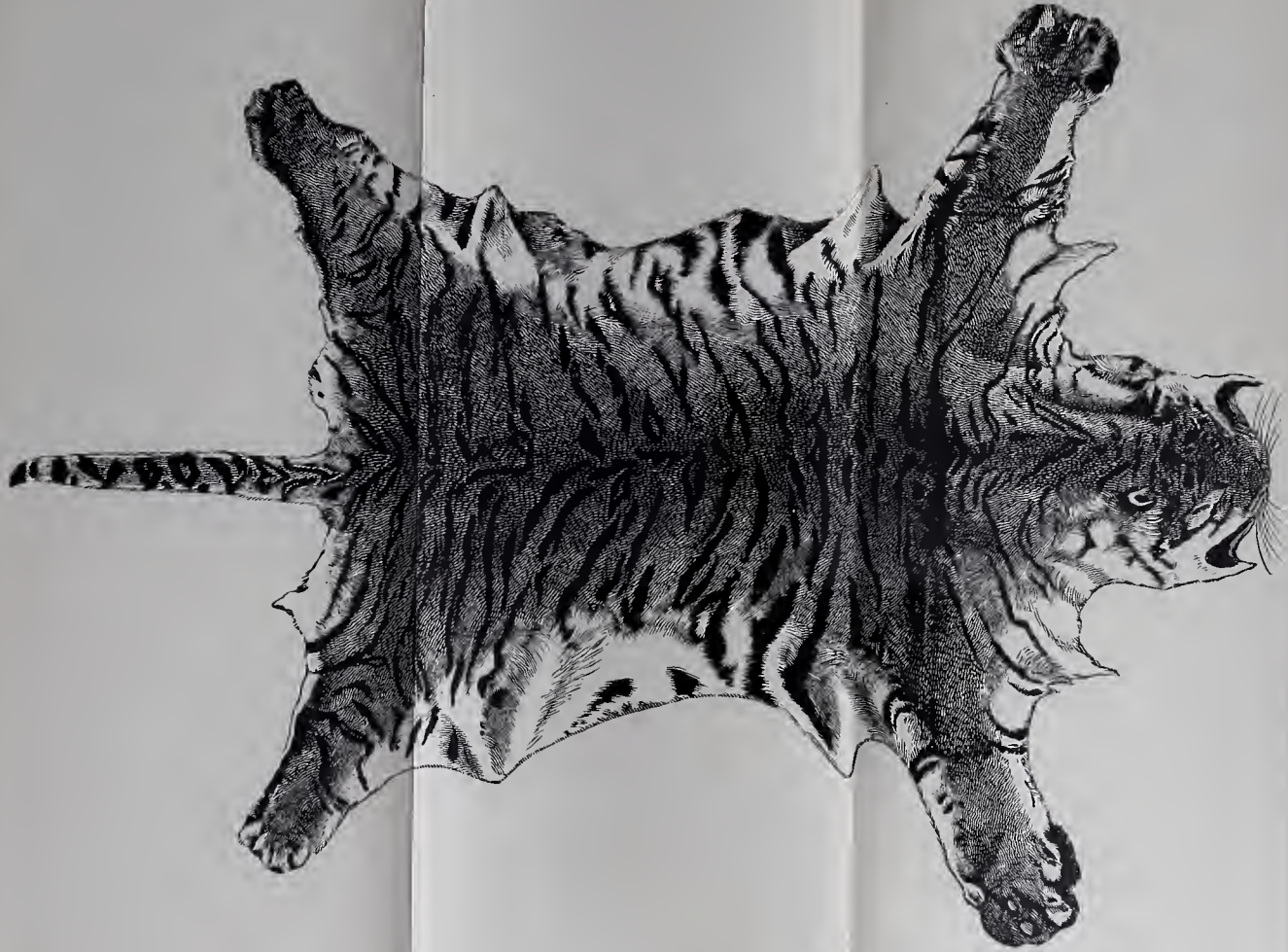


A WOOD-PIGEON DECOY.

A useful part of the sportsman's kit is a photographic camera. An animal may be photographed with its surroundings, just as it fell; and the picture may be made a nucleus of interesting and instructive memoranda, of obvious value, as such details are too often forgotten, or the impression made by them effaced, just in proportion to the distance in time and space

from the spot. Photographic pictures of living animals, in their native jungle or forest, are now commonly taken in this manner, while hundreds of sea-birds on the wing wheeling over an Indian headland have been reproduced with such accurate representation of the individual birds, that when enlarged the picture is almost life-like, and well worthy of detailed and leisurely examination.

Nowadays, however, so many freshly killed animals have been photographed as they lay on the ground, that such pictures are very common ; and in place of this, I advise photographing the head, ears, or the whole body in a position that will be of use to the taxidermist when the trophy arrives in England. The outline of the head is very useful, but there are so many photos of dead animals with the body and stomach inflated with gas, that I do not advise any more being taken. There have been some wonderful photographs taken recently of animals in their wild state that are very useful in setting up skins ; and, in fact, the taxidermist could never have reached his present advanced stage without the aid of instantaneous photography. Even the old "naturalists' camera," brought out by myself, in which the plates were only an inch square, was a great advance on the old methods of photography. On one occasion I asked a photographer to develop some of these small plates, but he refused, and said it would only be a waste of time to try to develop them. However, I got him to put in some plates in my presence, when he was astonished at the sharpness and the beauty of the photographs when developed. Previous to the invention of the instantaneous camera, I used to have to go to the "Zoo," and model an animal in wax before I could mount its skin to my satisfaction.



SHOT BY H.H. THE MAHAJAH OF COOCH BEHAR.
(Length before skinning, 10 ft. 1½ in. ; dried, 11 ft. 7 in.)

The knives or other implements should be as few and simple as is consistent with real efficiency; a tiger, for instance, can be perfectly well skinned by a skilful hand with an ordinary knife, costing only a shilling or so. It is highly important that some means should be adopted for efficient and accurate record of scientific data concerning natural features that are evanescent, such as the colour of the eye, of a bird's bill and legs, etc.; but it is not too much to say that the whole of such apparatus may, by well-considered ingenuity, be carried in the compass of a case whose capacity is only a few inches. Before all things, it must be borne in mind that the value of any object secured and preserved depends on the completeness with which all its natural features are preserved, as well as the condition in which the specimens are kept. This is true in degree for whatever purpose the object be designed, but it is essential in regard to specimens for the illustration of natural history. Moreover, at the present day, when many species are split up into a bewildering number of local races, the exact locality where each specimen is obtained is a matter of the utmost moment.

GENERAL HINTS FOR THE COLLECTOR

DIRECTLY a specimen is secured, inspect the eye, and make a concise memorandum of its colour and any peculiarity of its appearance. A note should also be taken of the colour on the bills, legs, etc., of birds (the brilliancy of which may fade), and particular mention should be recorded of the eyelids, and, if they have any, their colour. The same may be said with regard to wattles and other areas of naked skin, because very frequently when these parts dry, the colours not only fade, but sometimes absolutely change, so that the taxidermist at home may be led to a wrong conclusion. Never omit and never defer the making of these memoranda.

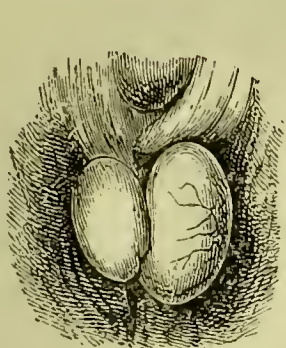
It is better that specimens of all warm-blooded creatures should be cold before operations are commenced.

In dealing with birds care should be taken, directly they are shot, that the plumage be not broken or injured by putting many of them together in a bag; and that the blood from one fresh specimen should not injure another. Instantly plug up with cotton-wool the throat, nostrils, and all shot-holes. Rare examples can be isolated in cones of paper, or otherwise, as soon as secured. It is often advisable to save at least the *sternum*, or breastbone, with the *coracoids*, the

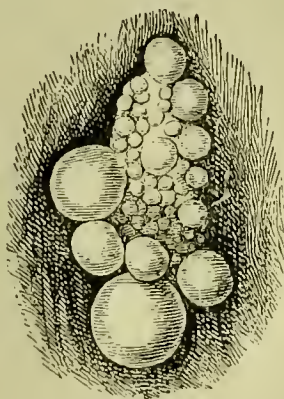
furcula (merry-thought), and *scapulae* of birds, and also the skull, when the skin is not preserved.

Pay particular and unvarying attention to the labelling of specimens.

Labels of convenient, durable material should be provided. Note thereon:—Date; a number; where killed; native name; scientific name; sex; locality; habits observed; colour of the eye, etc.; and any other peculiarities of colour. To sex a bird, examine the



MALE.



FEMALE.

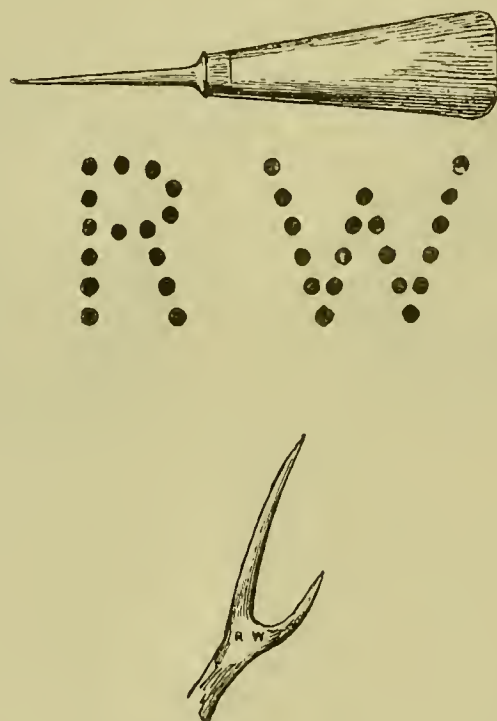
THE SEXUAL CHARACTERISTICS OF BIRDS.

reproductive organs in the inner regions of the loins, and if male mark it ♂, and if female ♀.

This question of ticketing, and the preparation of the label, is all-important. There is little if any doubt that the brilliant colours of a fresh, healthy specimen at the moment it falls always deteriorate, and are sometimes totally altered under treatment by any preservative. Therefore, when the "colours" are noted, the collector should, if possible, always put on his label a blot of water-colour pigment to reproduce, as near as may be, the brightness and quality of the tint. Although this may need some ingenuity, it will not be found difficult; a few cakes of water-colour and a brush

take little space, and the gain by this record will be great. Sexing birds is of much importance; and, if necessary, can be effected by means of a slight dissection, when, if ovaries are seen, the specimen will of course be a female.

Metal or leather labels corresponding to those on the skins, etc., should be attached securely to skulls, horns, bones, etc., so that exact identification may be easy



MARKING SKINS AND HORNS.

and certain. But, in addition to such labels, skins should always be marked for absolute identification (ownership) in the following manner:—With a proper awl puncture the owner's initials from the inside of the skin to the hair, as in the diagram. Do this near the root of the tail on the hind-quarters, etc., and pierce right through the skin. The mark is indestructible, even if it seem to close up, and always becomes visible on cleaning the pelt. When a head is saved, make

them on the scalp or neck, but always in one position ; and for all future time you have, if need be, an indestructible means of recognition. This is a method of marking usual in the Jungle Studios, and it may well be more widely applied.

For similar reasons, the horns of animals ultimately intended for the decoration of walls at home may be marked with initials in ink or pigment on the side that will not be presented to the spectator when they are in place.

But they should also be labelled, zinc labels wired on being the best. Particular attention is directed to this, not only on account of the obvious scientific value of such registration, but because much confusion of ownership often occurs when a party of men shoot together. The distinctive marks or dimensions of individual specimens are mostly so slight, yet so important as to value, that the best endeavours to adjust matters at the end of a campaign often end unsatisfactorily, for in such cases memory is treacherous.

Be as careful as possible in all operations ; and especially that no blood or grease, or juices from the offal, injure the feathers or fur. In packing skins and heads of antelopes and deer, it is advisable, so far as practicable, to keep the skins apart from the skulls and horns.

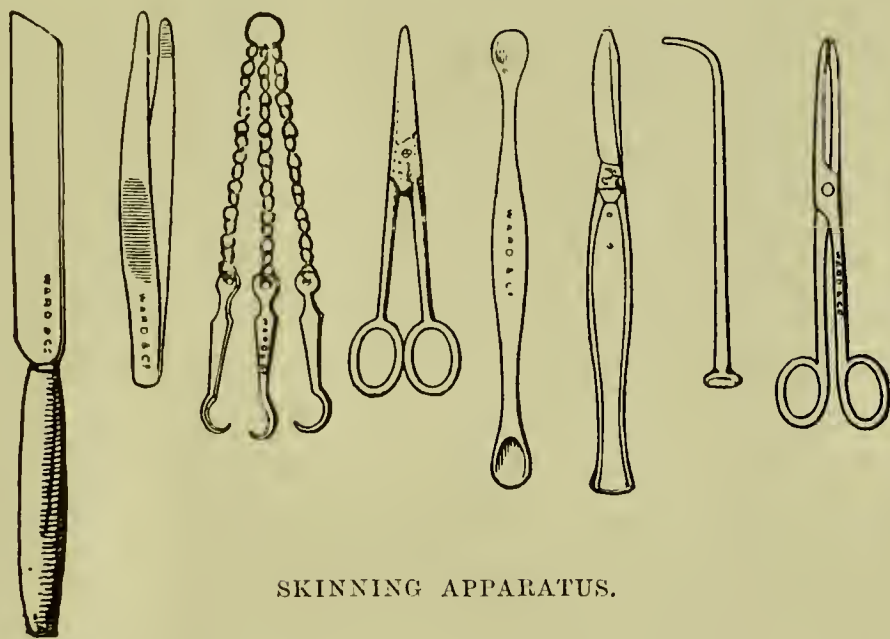
It is generally far better to attend to the preserving of your own specimens, than to trust to native agents or servants ; if you are compelled to trust to them at all, never sanction the use of lime in the materials they employ, even as a small constituent. Some natural substances (berries, etc.), used by natives, will change the colour of specimens ; the yellow ground of a leopard-

skin may, for instance, be thus changed to reddish brown.

In the case of hollow-horned ruminants, such as antelopes and buffaloes, turpentine should be poured into the horns after they are dried. If paraffin be used, it should not be allowed to get on the skin, as, from its greasy nature, it will do harm.

SKINNING AND PREPARATION

THE apparatus necessary for the skinning of animals is really very simple, and should be kept to the lowest proportions, as it is the skill with which it is wielded that is more important than the quality of the knife.



SKINNING APPARATUS.

- | | |
|-----------------|----------------------|
| 1. Knife. | 5. Brain-scoop. |
| 2. Forceps. | 6. Scalpel. |
| 3. Chain-hooks. | 7. Blowpipe. |
| 4. Scissors. | 8. Wood-wool pliers. |

A shoemaker's knife, a small saw, a pair of pliers, and perhaps a pair of cutting pincers, are all that are required for operating on the most important game. Some small implements for the lesser specimens being added, this is all the kit that need be carried.

For the following notes I am indebted to Mr. Cunningham :—

“Many sportsmen are apt to overlook the importance of devoting personal care and supervision to the preservation of the trophies that they have obtained ; and too often the hunter considers that, having shot his game, his work is over, and the trophy is left to the care of native followers to skin, treat, and preserve. *Nil sine labore* is a most excellent maxim ; but even a moderate amount of personal work and supervision will go far towards producing a perfectly preserved trophy. In the case of unusually large specimens or rare animals it is advisable to take a few measurements, for although these may not be of much direct importance to the sportsman himself, they are of great assistance to the taxidermist, and may be of real scientific value. With a steel tape record the length from the tip of the nose to the root of the tail, following the curves of the neck and back, and holding the tail at right angles to the backbone. Next measure from the root to the tip of the tail, excluding the terminal hairs. Lastly, measure the ear, taped from the bottom of the V-shaped notch at the base to the tip, excluding the terminal hairs. Preferably the results should be recorded on a rough outline of the animal in millimetres, excepting in the case of very large animals, when inches and their fractions may be used. Steel tapes can be obtained scaled on one side in inches and on the other in millimetres. It is well to smear a little thin oil over such steel tapes occasionally, as they are apt to become brittle and difficult to read owing to rust, and are then liable to break easily.

“Instructions with regard to the proper incisions and the methods of removing the skin are detailed

below, but it may be mentioned here that in many tropical regions decomposition sets in very rapidly, and if it is desired to preserve the entire skin, but at the same time it is found impossible to start on the work immediately, the carcase should be disembowelled and covered with grass or leafy branches to protect it from the direct rays of the sun till the following morning."

This method of measuring along the curves of the body is the one usually favoured by sportsmen, and is of most value to the taxidermist. A more strictly scientific method is to place rods perpendicular to the long axis of the body at the nose and the root of the tail and measure the interval between them in a straight line. In recording measurements it should always be stated which of the two plans has been followed.

As regards the general mode of procedure, the best operator is he who carefully does what is necessary to carry out his purpose, on true principles, according to the means at his command and the nature of surrounding conditions; he who simply copies what others have done in given circumstances, probably forgets the conditions under which they succeeded, and that the conditions are not necessarily the same in his case. Let a man be master of the occasion, and his position will be good, even if it be different from any that has gone before. What has to be done is simply this—and the remark applies equally to large or small game, birds, reptiles, or fishes: A beast having been slain, or a specimen secured, we have to remove the skin, preserving the external natural features, as completely as possible. After the skin has been removed, with as few incisions as possible, the question of its

preservation has to be taken into consideration. This is discussed fully in the next chapter, but a few points may be conveniently noticed in this place. And here I may again quote from notes kindly supplied by Mr. Cuninghame, who observes that "it is essential, in order to secure the best results, no matter what process of preservation is employed, to have the skin thoroughly clean and freed from all flesh, fat, and adhering tissues. There is a thin layer of muscle, termed the *paniculus carnosus*, in all mammals which adheres very tenaciously to the skin, and great care should be taken that this is completely removed; this being most easily accomplished by devoting extra time and care to the process of flaying the carcase."

Decay must be averted by the application of preservatives, as detailed in the next chapter, and when this has been done and the skin, etc., properly packed, the trophy may be sent home. The preservative and precautions suitable to an Indian or African climate may, however, have to be modified in North America, while those adapted to highlands will fail in lowlands, and forms of preservation which will serve in damp forests may be quite unsuitable to open, dry steppes. There is, in fact, no preservative, or book-recipe, or report of other persons' experience that can compare in value to quick, true judgment and cultivated common sense.

I now proceed to describe in such detail as appears necessary the skinning and preparation of one representative of each animal class; and my reader must trust himself to adapt the practice by the light of his own judgment to the specimens, large or small, with which he may have to deal, when he will soon find his practice surpass in usefulness the most compendious book of recipes and directions.

LARGE GAME.—When the animal is secured and ready for operations, first turn it on its back, and stretching apart the fore and hind legs, proceed to remove the skin as in the annexed illustration. In all cases where the skin is wanted entire, this is best done by making an incision from the corner of the mouth, along the middle line of the belly to the extremity of the tail; but in doing this, cut only just through the skin, and be careful not to injure unnecessarily the carcase, and especially the intestines. Next make lateral incisions in order to strip the limbs:—for the fore



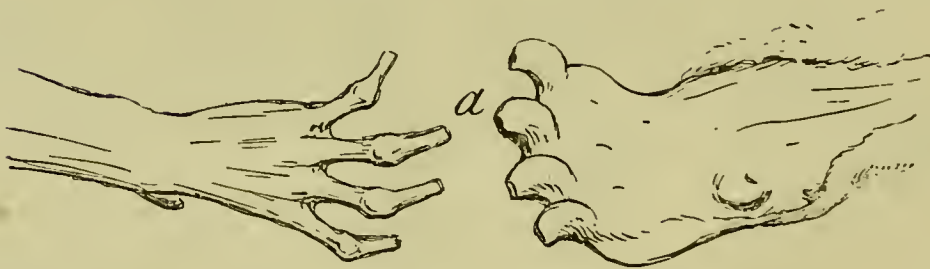
SKINNING A TIGER.

legs from the edge of the central incision through the arm-pit, along the inner side of the limbs, the line of incision inclining slightly to the outer side, in order that the seam may be less perceptible when the specimen is mounted. A like process through the groin is necessary for the hind legs. The incisions thus made leave the skin in the form of tongue-pieces over the breast. After this, apply the knife to these points, and detach the skin round to the spine and along the tail. In doing so it is necessary to clear the limbs, when great care must be taken to leave intact the natural features of the foot. The last toe-bones may

be left in the skin, whether with the smaller specimens of the cat tribe or antelopes and deer ; but in big animals, such as an elephant or rhinoceros, it is better to remove them altogether. Now turn over the carcase, and draw back the whole skin over the head, exercising particular care in separating the ears and the eyes from the skull. Similar care must be taken as to the lips, since if the rim of the eyelids be severed by the scalpel, the injury spreads in a remarkable manner, often so



PAW SKINNED FIT TO STUFF.

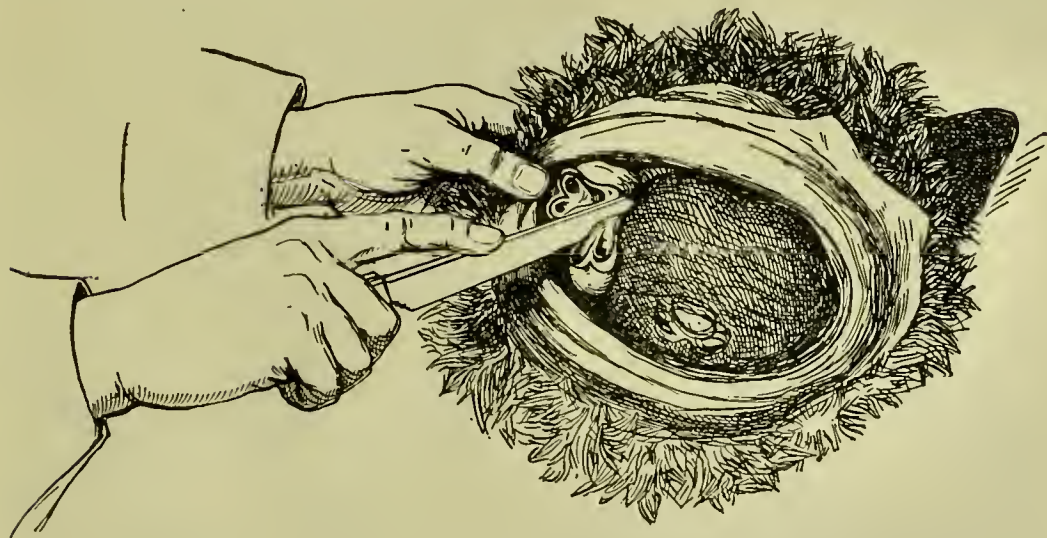


PAW SKINNED FOR RUG.

SKINNING PAWS OF A TIGER.

badly as to render the damage strongly conspicuous. The ears should now be severed from the skull close to the bone, or their lower structure will present too large an aperture. The lips must be cut off close to the gums. When the skin has thus been removed, it must, as mentioned in Mr. Cuninghame's note, be cleared of all fat and flesh. The cartilaginous portion of the ear must be turned through to within about a quarter of an inch, or even less, of the ears—an operation entailing

time and patience. The lip must be treated by passing the knife between the mucous lining and the outer skin all round the mouth, so as to admit of the preservative completely penetrating this thick portion of the specimen. The eyelids and the feet must each be treated in a similar manner for the same reason. Finally, great care must be taken that the claws or hoofs are well kept, this being specially necessary in the case of tigers, whose claws (and whiskers) are valued by the natives.

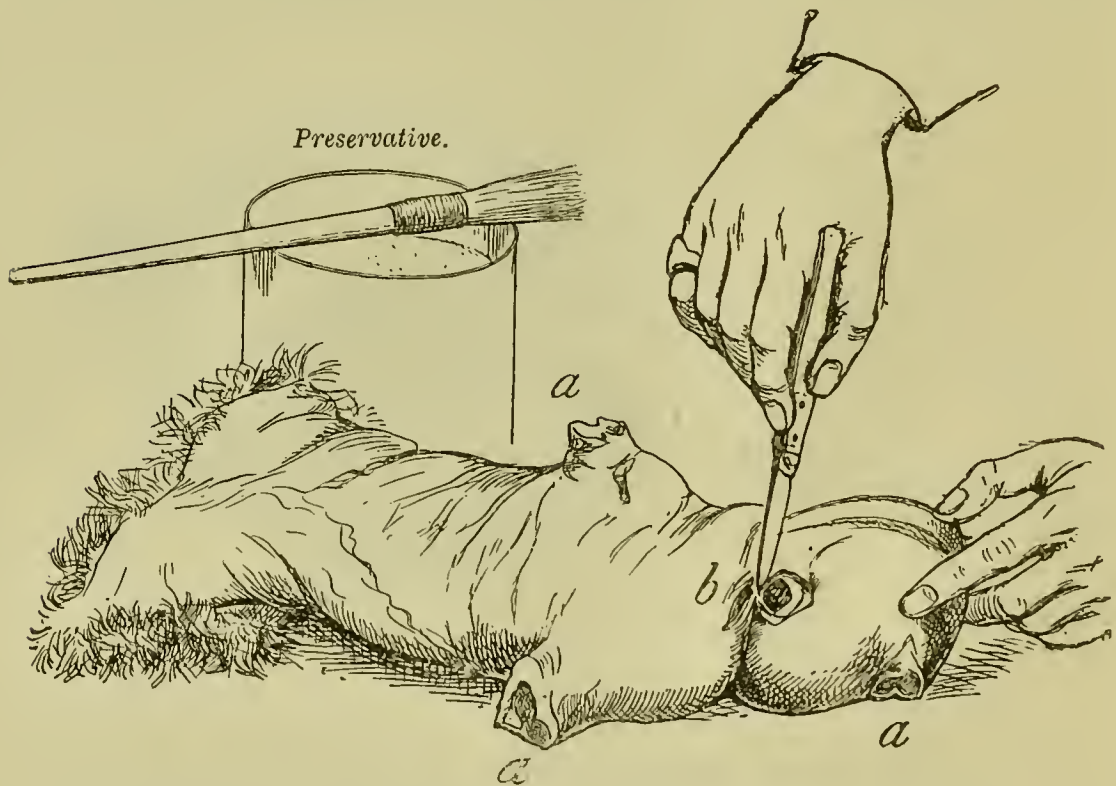


TURNING BACK SKIN OF FOX'S EAR.

A great deal of the above description applies to the skinning of a fox's head, which I particularise because it is an operation which frequently exercises the amateur naturalist, and it well serves to exemplify the proper treatment of most hornless animals. The illustration above shows the process of turning back the skin so that the cartilage of the ear may be operated on; while the cut on p. 36 is designed to explain the delicate operation of treating the eyelid—a part of the work over which the greatest care must be taken. The removal of the lip at its juncture with the gums,

and the cutting of the nostrils, are treated in the illustration on p. 45.

A common source of trouble to the sportsman in Africa, India, Ceylon, etc., is the proper treatment of an elephant's foot. This part, as well as the head, is a recognised trophy, since it affords a gauge of the height of the animal, and also because in ordinary circumstances the skin of this mighty beast is so difficult

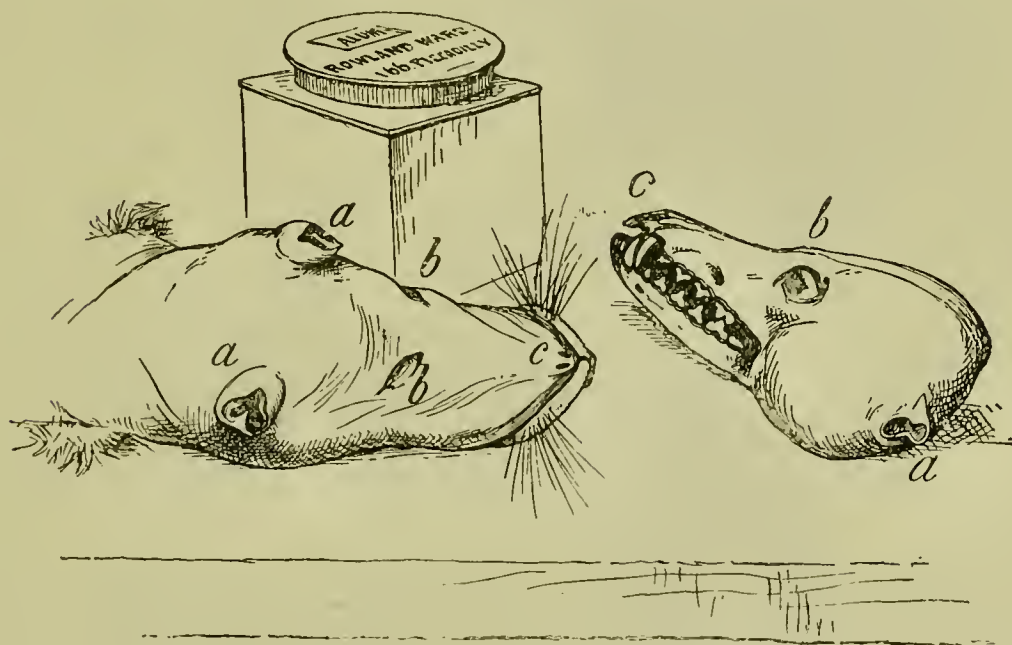


SKINNING FOX-HEAD.

of transport; and although it can be converted by skilled workmen into innumerable articles of domestic utility, its value in private hands is by no means always appreciated. In the case of the foot there are, however, no such difficulties, and it is particularly suitable for conversion into useful articles, without impairing its natural form and structure.

The fore-foot should be severed either at the so-

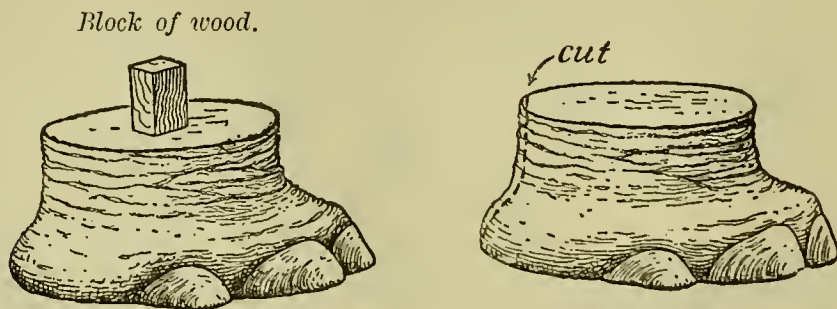
called knee (that is, wrist), or at least 12 inches from the ground, and a cut made down the back side; after which the skin must be separated from the flesh, and the casing of the foot brought away in one piece. Extract every particle of flesh, because if any is left it is liable to get tainted, when it will be impossible to get rid of the odour. If possible, wash the inside of the skin with carbolic water, or apply powdered preservative both inside and outside. Then place the



FOX-MASK SKINNED.

foot to dry in the shade, taking care that the skin does not fold and is in all parts accessible to the air. Although not absolutely necessary, it is desirable that the skin should dry in the natural shape. It is a good plan to insert a big bottle or a block of wood in the centre, round which dry sand may be rammed, so as to distend the skin as near as may be to the natural shape. The sand may be changed as required for the drying.

Another way, after severing at the knee, is to cut along the back right down to the sole, and also across the latter in the form of a cross, and then skin. By this method it is much easier to extract the flesh, although more difficult to get the skin back to its original shape. Take great care not to cut off the outer skin or epidermis whilst skinning; even with ordinary care this is very apt to happen, as during the process this is on the inside. It becomes, however, the side that is visible when the trophy is completed, and many specimens are rendered useless through neglect of attention to this detail.



PRESERVING AN ELEPHANT'S FOOT.

Yet another way is to proceed as above, but after cutting along the back of the foot to the sole, to run the knife right round the latter, just behind the toes, and remove the central piece of skin. By this process it is quite easy to get all the flesh out, but it means that the foot is brought home in two or more pieces, so that care must be taken not to lose any portion. The central piece of the sole that is taken out may be made into a handsome tray.

Rhinoceros and hippopotamus feet may be treated in the same manner as those of elephants.

It is, of course, important that the foot should be protected from insects, and to this end, when the

specimen is quite dry, saturate it as thoroughly as possible with turpentine. This will not hurt, but rather help to preserve, the skin.

The foregoing treatment of a specimen will serve as an example of such adaptations, but the purposes to which portions of trophies of this nature may be



ELEPHANT'S FOOT LIQUEUR-STAND (Registered Design).

put are varied, and, indeed, almost endless ; and many a sportsman, when he has arrived home, has wished he had been aware of this while in the field. The hides of elephant, rhinoceros, hippopotamus, and tapir may likewise be treated for a variety of useful purposes ; if the whole skin cannot be saved, a part may be preserved.

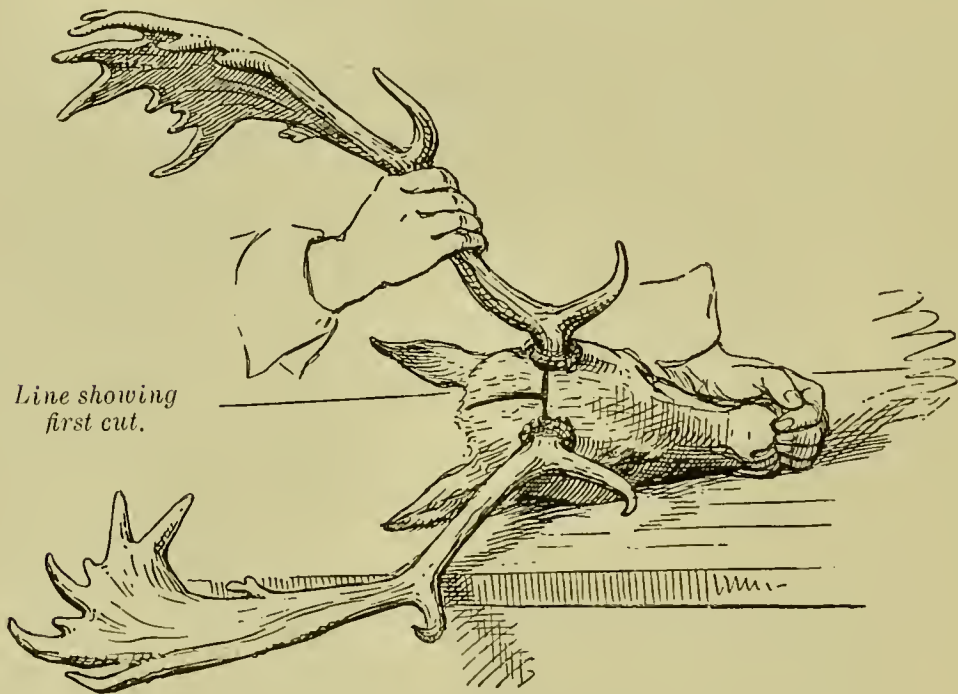
The shields or plates of a rhinoceros—the thick

portions of the hides between the folds—should be brought away entire, and can be made into table-tops, trays, caskets, etc., which, if kept dry, will retain their shape. By a process to perfect which I have laboured many years, and have now patented, a beautiful surface-effect can be obtained under an exquisite polish. When large portions of hide cannot be transported whole, the skin may be cut into strips of about 27 inches square, from which sticks with steel centres, whip-handles, etc., may be afterwards made. It must be remarked, however, that sticks thus made, although beautiful, are not well adapted to all purposes; because, if bent, much of their beauty—they look like semi-transparent amber—is deteriorated by an opacity that clouds their lustre where the bend comes. They are indeed more ornamental than useful; but for trays, boxes, bowls, inkstands, tables, etc., the material is admirably suited.

One of the most notable applications that has been made of the patent process was a large table produced for presentation to His late Majesty King Edward VII, by whom it was graciously accepted. The exceptionally massive piece of hide utilised for this purpose was of African origin, and came from the Kilimanjaro district. It was nearly 4 feet in diameter when made into a circular shape; and, after polishing, showed a lustrous surface like fine clouded amber, with transparent portions. The edging of this table was embellished with a cornice of rough hide on which the epidermis remained, and presented a bold contrast to the lustrous centre. The supports were formed of polished rhinoceros-horns, set on a base formed by the polished section, complete with its bark, of a magnificent coniferous tree, 2 feet 6 inches in diameter.

Special attention may now be directed to the heads of animals, as it frequently happens that it is desired to save these for preservation as trophies, while the rest of the skin is either abandoned or reserved for rugs. Heads with antlers or horns are prepared for preservation either on the naked bone, or to be set up to imitate living nature. In the latter case, care must be taken to take the skin of the whole neck. Make the incision up the back of the neck, and over the head between the ears until the horns are reached ; if these are wide apart, cut between them right and left, carrying the incision right round the burr or base of each horn. In separating the skin from the burr or base, the knife should be used neatly, with a plunging action of the point, so that not a particle of hair or skin is sacrificed at this part. He is a bad workman who leaves a morsel of the skin attached to the bone. In clearing the scalp be very careful not to let the knife injure the skin, and more especially the eyelids, nostrils, and ears. The delicate skin round the eye is nearly hairless, and must not on any account be torn or jagged. In a head the eyes and nose are the most prominent parts, first claiming attention. In treating the nostrils and upper lip, operate from inside the mouth ; sever the lip neatly high up the gum, over the teeth, and in like manner detach the lip below. The skin presents in these portions a remarkable thickness, into which, from the inside, a neat midway incision should be carried all along, so that the preservative may penetrate and be carefully rubbed into the cut in order that these parts may be saved properly. The wood-ash or alum process is perhaps the best ; but if more convenient the skins may be preserved in pickle (see p. 71) or salt (p. 80). Clean the skin of all fat and flesh ; rub

in the preservative, but not on the outside of the nose, and hang up the skin to dry. If there should appear any likelihood of the short hair round the eyes and nostrils slipping, apply the preservative carefully. Be sure to save the lower jaw. When the head is that of a wapiti or other large animal, and is to be set up with the skin on, it is often a matter of great convenience in packing the horns to saw the skull in two, longi-



FALLOW-DEER HEAD.

tudinally, by which much space will be gained. If, however, the trophy is to be mounted with the skull alone, this severance is inadmissible; and it should in no case be adopted with smaller heads, which are, in fact, quite destroyed by cutting, the skull being much weakened, and at the end of the journey often broken to pieces. Such a state of things necessitates much extra labour and expense, even if the injury can ever be repaired. North American trophies are frequently received in a deplorable condition from this sort of

injury. For preservation in the bone, the flesh may be roughly taken off, and the skull cleaned by boiling, by maceration in a stream, or by burying for a sufficient period in an ant-hill, or in sand, as described on p. 73. But be sure and keep the specimen from dogs or other animals. In regard to the ears, when the skin is removed, and the cartilage separated close to the bone,



SEVERING THE EAR FROM THE SKULL.

trim it neatly with the scissors so as to remove all not wanted inside, but do not take too much, or an unsightly hole may appear when the head comes to be mounted. Next insert the thumb and finger from the inside so as to separate the inner from the outer skin, forming, as it were, a flat bag; but do not carry this separation too near the edges. Into the line of division preservative must be carefully put. When mounting specimens, it is my practice to fill the space with com-

position, which keeps the ear permanently of the proper size and shape. The old way of sewing a piece of card on the outside is not to be recommended, as it allows the skin to shrivel and shrink, so that its natural beauty can seldom, if ever, be restored. Hollow horns (as of sheep, antelope, etc.) have bony cores, from which



REMOVING SCALP FROM CORNER OF THE EYE.

they may be detached and packed separately ; and in such animals the skull should be kept, and so much of the tips of the cores as seems superfluous removed.¹ The horns of antelopes, goats, sheep, and gazelles should, when possible, be taken off and the grease and blood removed. If the bony cores of the horns, as well as

¹ See special instructions for packing, p. 42.

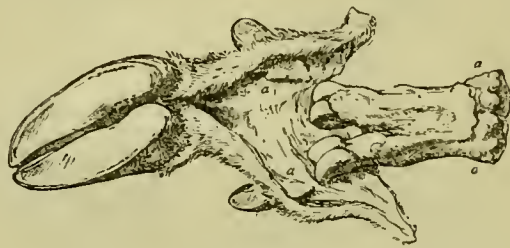
the inner sides of the horns themselves, be well dressed with turpentine, it will save all risk of damage by insects.



SEVERING THE LIPS FROM THE SKULL.

Another attractive trophy is the foot. Whether it have a cloven or a solid hoof, many useful and ornamental things can be made from this part of the animal.

To preserve it properly, the skin should be slit longitudinally at the back, but not detached from its juncture with the horny substance. In the case of large animals, it is advisable to extract the toe-bones from the hoof; but if this cannot be done, the knife should be passed all round them so as to ensure their complete severance from the surrounding tissues. All flesh, muscle, and sinew should be removed, as well as all bone not required. Finally, scrape the skin, after which, provided that it is fresh, it can be put direct into the carbolic

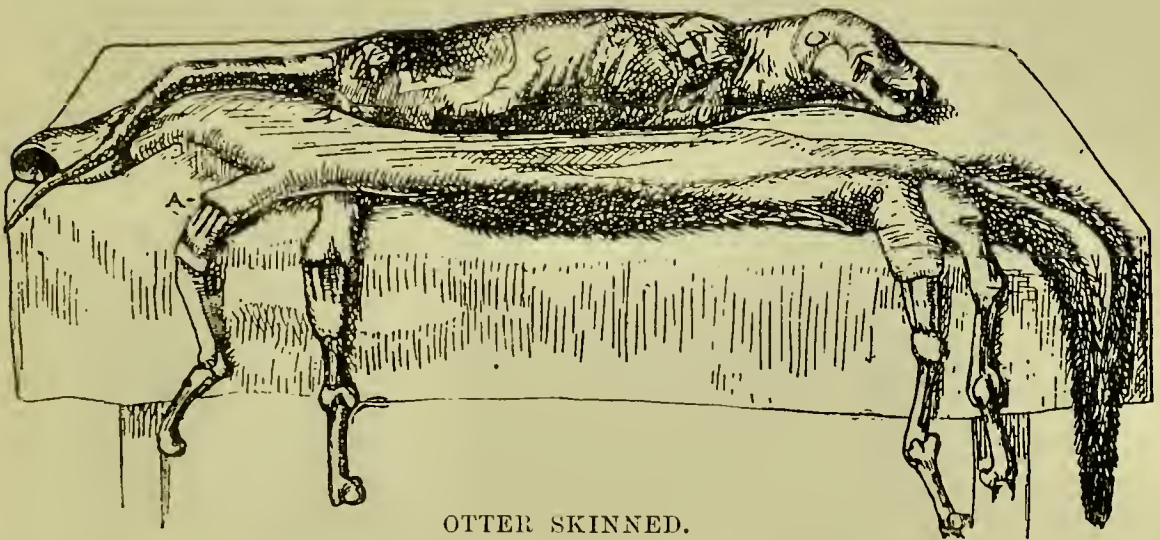


STAG-SLOT PRESERVED READY FOR PACKING.

can (p. 94). In the illustration the bone is depicted as it comes away from the hoof.

SMALL MAMMALS.—These can be preserved for dissection and preparation, when necessary, in spirit, or, as described in the cases of large skins, in liquor. When they are thus treated, an incision must be carefully made in the trunk, and the intestines, with as much blood, mucus, etc. as possible, removed; the liquid will then penetrate, and the carcase should be soaked in spirit or liquor for some time, in order that the fluids out of the body may be drawn out, after which the specimen should be removed into fresh spirit, strong enough to light with a match, and so packed. The receptacle should be completely filled.

In preparing skins the skull and the bones of the legs are to be left in the skin. The animal being placed on its back, make an incision from the *sternum* (breast-bone) to the root of the tail, next separate the skin from the carcass, so far as can be conveniently reached, and sever the limbs from the body at the shoulders and thighs. Each limb can then be drawn out—as a glove might be turned inside-out—but the bone must not be separated at its junction with the toe, nor the skin of the foot or leg be in any way injured. Next



OTTER SKINNED.

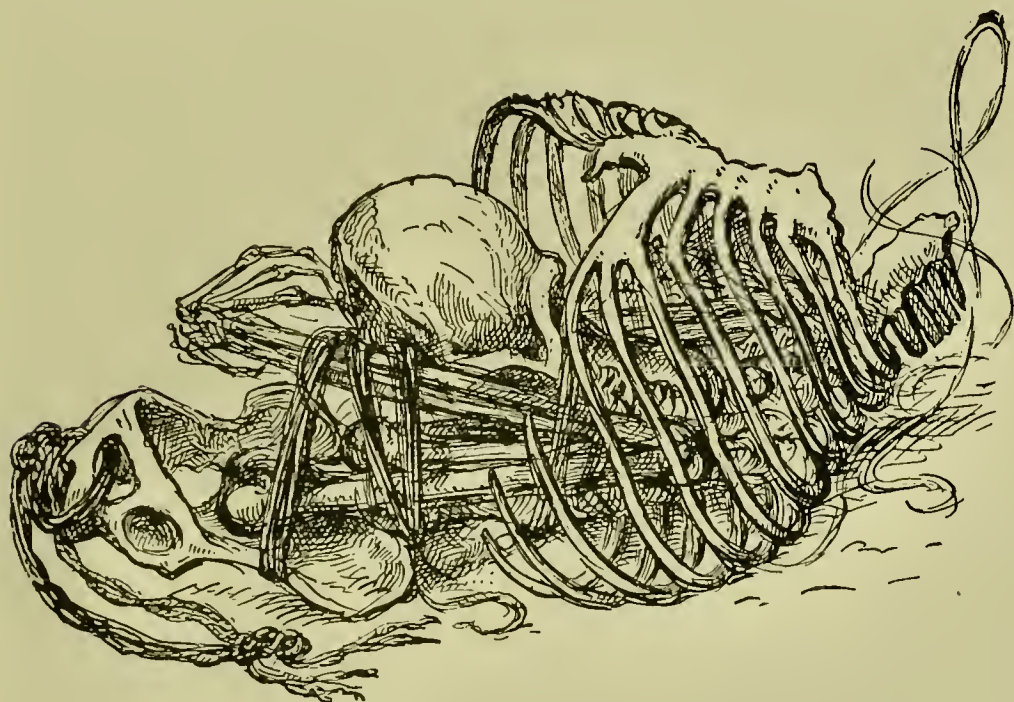
remove the muscles from the bone, which can best be done by cutting the tendons near the toes, and carefully drawing the whole mass away at one operation, so that it will come in one piece, not piecemeal. The bone will now be clean. Next cleanse the skin of the limb, and at the same time the other parts of the skin, of all superfluous flesh and fatty matter. Dress the inside with taxidermine No. 1, and apply some kind of preservative powder, or even wood-ash, particularly to the fleshy parts, such as the eyes, nose, lips, and feet. Then replace the bones in the limbs, having previously,

if possible, bound them with tow, or such-like material, so as to represent the muscle that has been removed. Place a portion of stuffing in the skin of the head and trunk, and suspend the specimen to dry. Alum being a most powerful astringent is liable to dry up the skin too much for mounting, but small quantities are useful on some occasions to set hair.

The tail may be treated in two ways. With an otter, for instance, as shown in the illustration on p. 47, it should be cut underneath to the tip, and the bone removed; but in the case of a fox, and most other small mammals, it should be treated thus:—Sever the *vertebræ* from the trunk close up to the body, leaving the tail in its sheath. Then turn back the skin until enough of the tail protrudes to fasten securely with a string, that can be attached to a hook, or tree, or other firm holding. Next, with a cleft stick, or the handle of your pliers, pull the skin-sheath down toward the tip, and the *vertebræ* will come away whole, wrinkling the skin to the end. Finally, dust preservative powder into the cavity, or, if preferred, insert taxidermine-paste on a stick (see p. 78).

SKELETONS.—When it is desired to save the skeleton of an animal, the procedure should be as follows: Having removed the skin, cut the fleshy parts away; this need not be done too closely, neither is it necessary nor desirable in the operation to separate the joints. The bony frame, or portions of the same, should next be placed where they can be covered by water; and as the object is first to extract all blood, it is well, as occasion requires, to pour off and renew the water, until it comes away comparatively clear. The next process is to leave the skeleton in the liquid till the soft portions putrefy, and so leave the bone clean. The

large bones that contain marrow must be perforated at either end, where the holes will be least observed, and returned to the water. They will come clean in due course, like the others. The process of putrefaction will occupy several months, but will be expedited by a warm temperature. When the decay of the fleshy matter is complete, the bones must be cleaned by hand, and should then be immersed for a few (say six) hours



SKELETON OF AN ORANG-UTAN READY TO PACK.

in a weak solution of lime-water. The bones are by this time quite separated, and it is all-important to see that not even the smallest be missing; a skeleton incomplete in any part being of no value. The bones must next be bleached by the simple action of the atmosphere in the shade. If the operator be abroad, the bones may then be packed for transmission; if he be where skilled assistance can be obtained, they are fit for articulation. In hot climates the teeth should be encased in wax or grease of any sort to prevent

cracking. The illustration on p. 49 shows the skeleton of an orang-utan arranged for packing.

There is, however, a dry system of cleaning skeletons which has recently come into favour, but which can only be used under special circumstances, and when plenty of time is available. It was described by Dr. R. F. Scharff, at the Conference of the Museums Association, held at York in 1910, as follows :—

“ I herewith contribute a few notes on a macerating pit which I had constructed in 1894 in the yard of the Dublin Museum. The water-tanks which had previously been in use for the preparation of skulls and skeletons gave such offence to the neighbours, on account of their unsavoury odours, that they had to be removed. Some members of the museum staff were by no means sorry for their removal, since the work among the water-tanks, laden as they were with the debris of animal remains, was certainly an unsavoury task. I had often heard of skulls having been dug into the sand near the seashore for the purpose of macerating them, and decided to try the experiment of putting partly cleaned bones into sand for some time, so as to study the effect. This was so successful, that I had a large box made of boards and sunk into the ground for the preparation of small skeletons. In 1894 the first macerating pit was built of brick. It was about 20 feet long, with a width of 5 feet, and built with one layer of bricks from about 1 foot below the surface of the soil to a height of 4 feet. The soil from this oblong-shaped structure was dug out to the depth of the bricks—that is to say, 1 foot deep—and several cartloads of pure sea-sand were poured into the pit, so as to fill it to within 6 inches of the top

Hence rainwater is able to percolate through the sand into the soil.

“ In this pit all the skeletons and skulls for the museum have been prepared for the past sixteen years. At first the sand was full of very minute white nematode worms, and I was under the impression that they were largely responsible for the work of removing the flesh from the bones. But they no longer seem to inhabit the pit ; and bacteria no doubt almost wholly perform the work of maceration.

“ After removal from the sand-pit, the bones are carefully washed and bleached with chloride of lime or peroxide of hydrogen. Otherwise there is no trouble ; and no smell whatsoever emanates from the pit or the sand that is taken out of it. This dry system is therefore in every way preferable to the old arrangement of water-tanks. The only difficulties of the dry system are to ascertain the length of time the skulls or skeletons should remain in the sand, and to find the objects when they are required to be taken out. Nearly 100 skulls and 150 skeletons of all sizes have been macerated in this pit. Sometimes when the bodies are very putrid they are put in as they are, skin and all. As a rule, the skin is roughly removed and the body thoroughly soaked in water. I find that skulls and skeletons are sufficiently macerated in about ten months on an average. Even skin and hair entirely disappear in about eighteen months. If left longer, the substance of the bone is apt to become light and porous, and finally to crumble away.

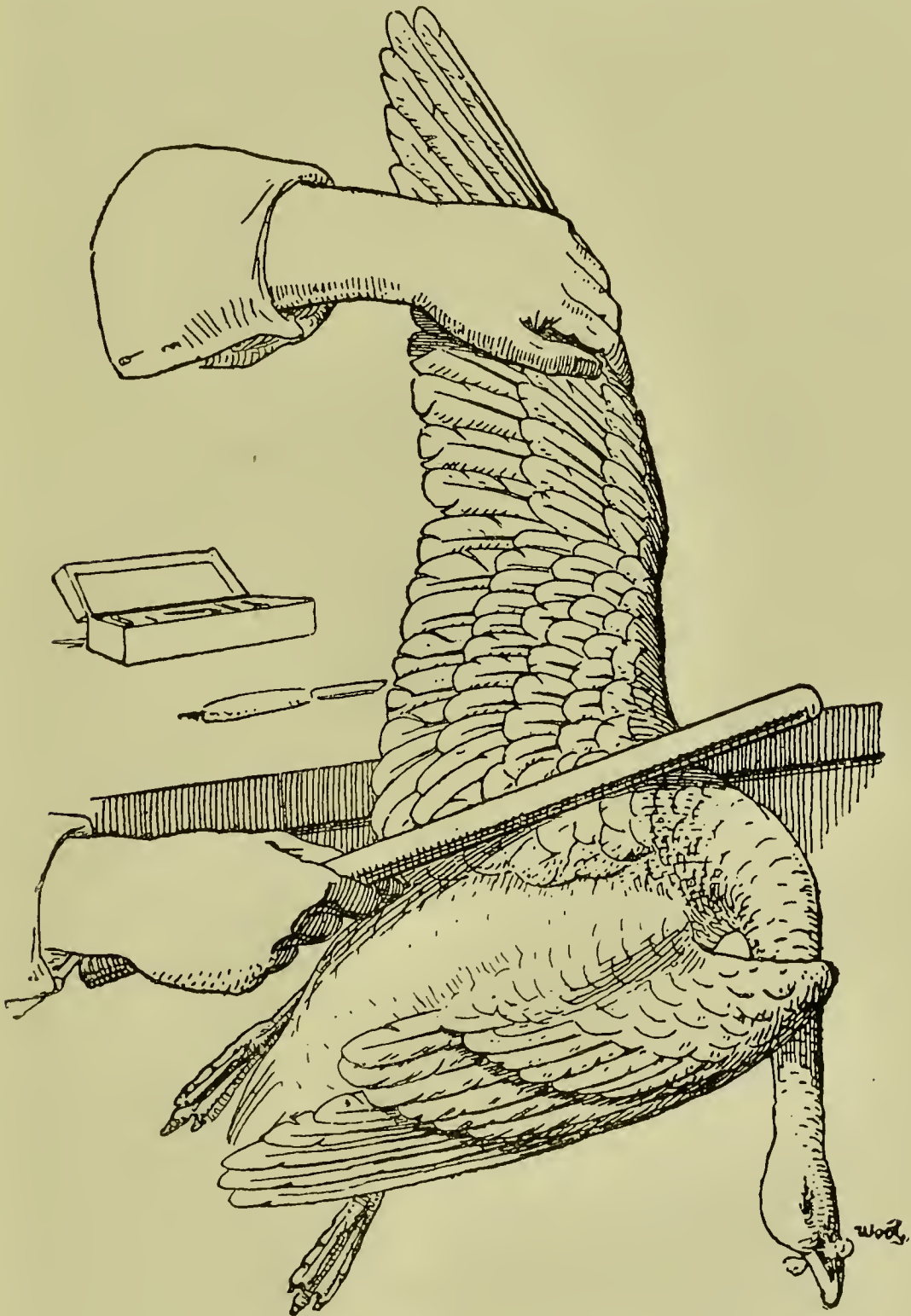
“ For the purpose of identifying the objects in the pit, I use old cigar-boxes, packing-cases, or any kind of box I happen to find. Holes are bored in the bottom, the lid is removed, and the box or case is filled with

sand, after placing the skull or skeleton in it. A tin label bearing some particular mark and number corresponding to that noted in the macerating-pit register is fixed to the box. A chart is kept in the attendant's room, on which the area of the pit and its contents are clearly indicated. By these means I can inform myself at once as to the position, i.e. exact spot and depth of soil, of any box, and its removal on any particular date is thus facilitated."

Recently a similar sand-pit has been constructed in the grounds of the Natural History branch of the British Museum, and has proved thoroughly satisfactory for macerating skulls and skeletons, even those of comparatively large animals.

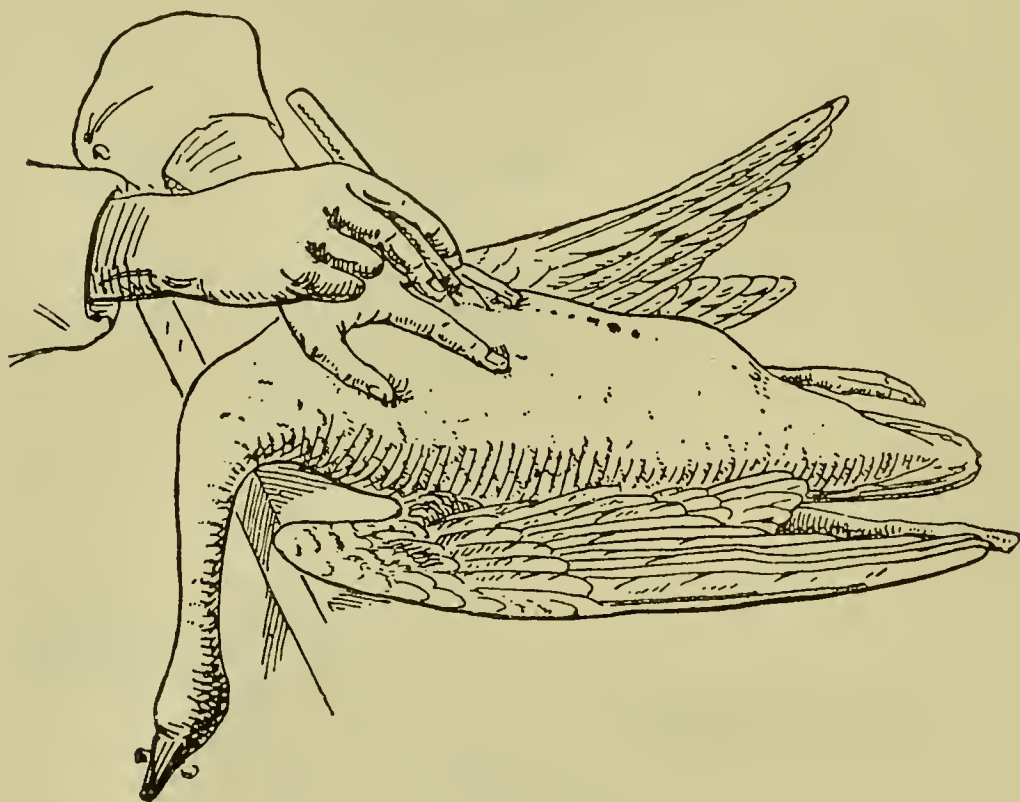
BIRDS.—In preparing the skins of birds, the first operation, after having seen that the cotton plugging of the throat, nostrils, and the shot-holes is safe, is to break the upper wing-bone (*humerus*) of each side close to the body. In the case of a large specimen, the most convenient and effectual way to do this is to hold the bird pendent by its wing against the edge of a table or board, so that the bone may be fractured by the sharp blow of a stick, with as little rough treatment as possible. But the skilful accomplishment of this is the gist of the whole work ; and the wing must be held by the upper feathers, pressed flat by all the fingers against the palm, so that the manipulation does not crush or even seriously disturb the lay of the plumes. The blow with the stick must be a firm, quick stroke of sufficient strength to accomplish the fracture of the line, and not simply to bruise the flesh, or so rough as, in breaking the bone, to unduly mangle the whole structure. The firmness of the

board or table-edge is a great element in the neatness of this operation. The action of the hand will best be seen from the accompanying illustration.



BREAKING THE WING-BONE.

This is the method for treating large birds. In the case of small specimens—that is, anything less in size than a blackbird—the wing-bone may be broken by the thumb and finger, or at most by the forceps. The wing-bone being thus broken, place the bird on its back, with the head towards you, in order that your knife may, what is technically called, “go with



THE FIRST CUT.

the grain of the feather.” By this is meant that the point of the knife should be deftly inserted under the skin, just at the end of the breast-bone; after which the skin should be raised till it bags, when the knife must be pressed forward in one clean, continuous incision as far as the vent, so that the skin may be separately severed, and the flesh remain uninjured. Amateurs are constantly inclined to make their first incision from too high or too low a point; and they

are also prone to injure the stomach in some part. The opening thus formed in the skin should be no larger than is necessary for the withdrawal of the body, since it is for this purpose alone that it is made. Indeed, with birds that have breasts of specially beautiful

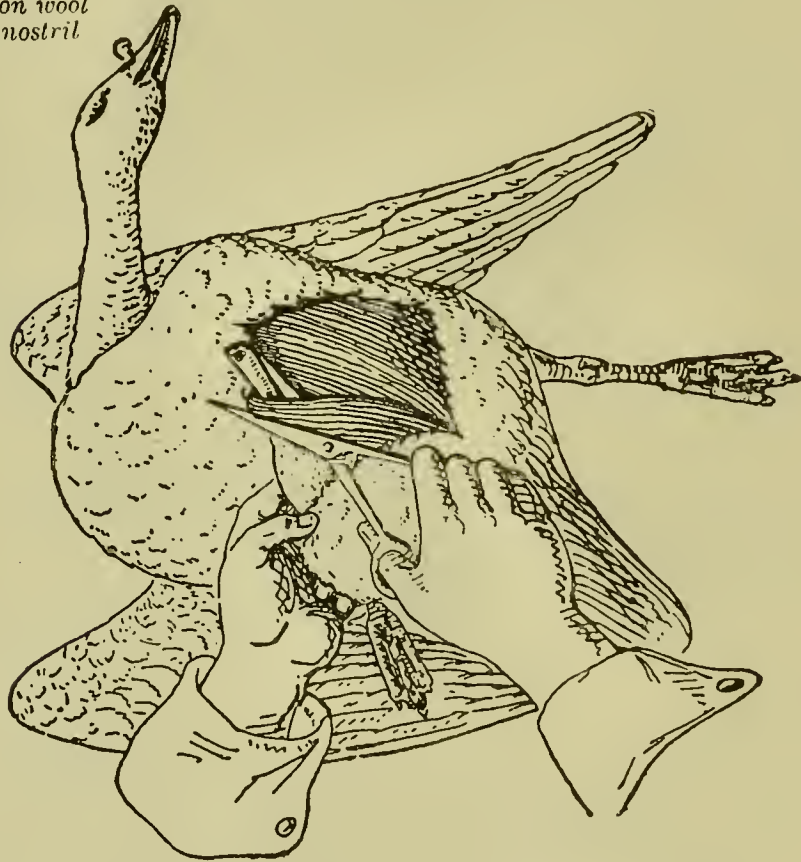


SEVERING THE LEG-BONE

plumage and short feathers, as well as with diving and swimming species, it is often desirable to make the incision under the wing instead of along the breast; the object being to get the body out of the skin in the cleanliest possible fashion, so that no grease or fluid may soil the plumage. The advantage of a neat opera-

tion, in which the body remains practically unbroken, will be at once apparent. Sometimes it may be desirable to take the body out through the back, when the incision is made in the same manner as it would be on the breast. In fact, the features to be especially preserved will rule the operator's choice in this respect ; but it is presumed

*Cotton wool
in nostril*



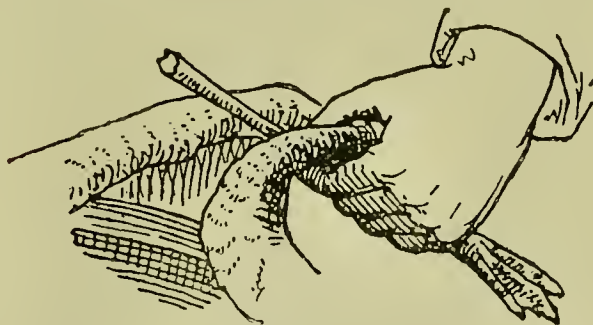
CUTTING THE TENDONS NEXT THE TARSUS.

that the cut will be made from the breast-bone, as seen in the illustration on p. 55.

Now put down the knife, and insert the fingers, which are the best instruments, under the skin of one side, and clear the skin from the flesh in all accessible parts. That done, insert below the skin a sufficient quantity of dry plaster of Paris, or such other suitable material as may be at hand, to absorb such blood or

other moisture as may at the moment be present. Treat the opposite side in like manner. Next proceed to force out the leg, to do which hold it firmly above the joint, and force the thigh through the aperture, at the same time carefully drawing off the skin ; insert the point of the scissors below the flesh next the bone, and move them skilfully up between the bone and the muscles, until, by raising the right hand a little, the scissors can be made to nip the bone transversely just against the joint ; cut the bone through and thrust it out from the flesh, and with the scissors cut the tendons next the ankle,

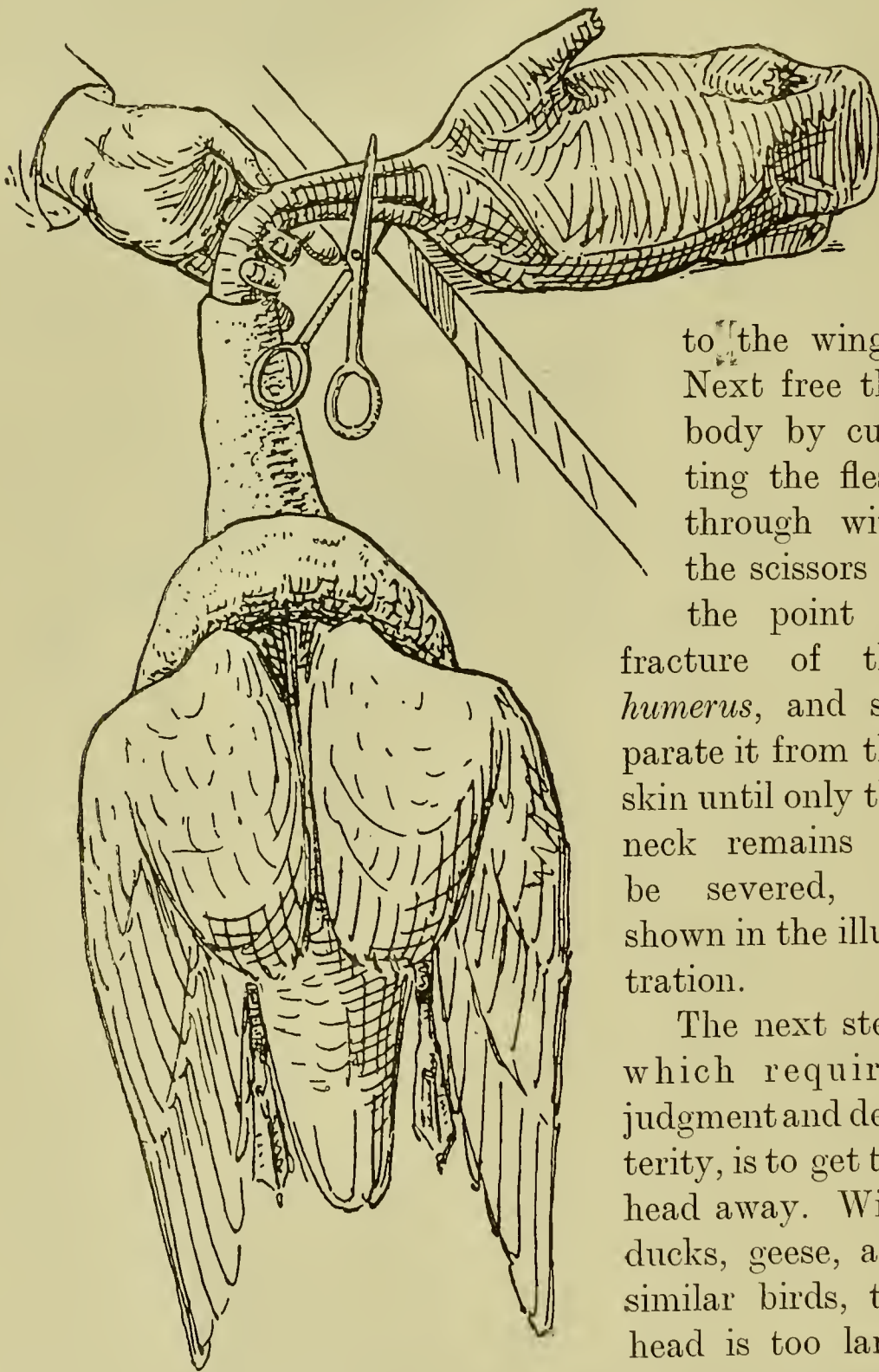
or *tarsus*, and the whole muscle of the thigh will come away in one piece, leaving the bone clean. The bone must be now cut near the knee-joint, leaving the head of



The bone, when thus freed, should appear as above.

the thigh-bone, or *femur*, which is useless, with the flesh attached to the thigh and body. Having thus treated both legs, skin up to the root of the tail, but in severing the *vertebræ* leave the whole triangular projection in which the feathers are imbedded for subsequent treatment. It is a common error to cut this portion too low down, when trouble results. Now turn the bird chest-downward, in order to skin the back ; this being an operation requiring more care than the one in front, because the thin skin carries larger quills, which are relatively more difficult to manipulate. The specimen is now lying breast-downward on the table, with the head towards you ; and the whole skin of the tail should be drawn over the

back, where the skin may be cleared by the blunt side of the scalpel, and the body will then be freed down

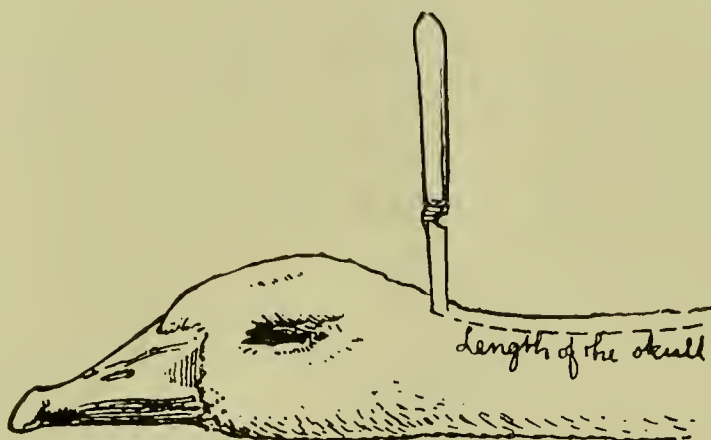


FREEING THE BODY

to the wings. Next free the body by cutting the flesh through with the scissors at the point of fracture of the *humerus*, and separate it from the skin until only the neck remains to be severed, as shown in the illustration.

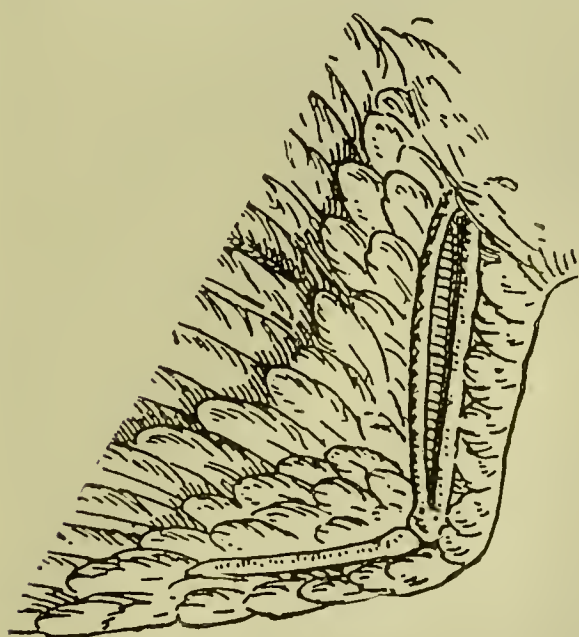
The next step, which requires judgment and dexterity, is to get the head away. With ducks, geese, and similar birds, the head is too large to come through

the neck-skin ; and, in such cases, an opening must be made neatly from the back of the head, about two inches down the neck, of sufficient size to admit of the skull being removed for cleaning. Through this orifice force the skull, skinning it carefully until past the eyes, and in doing this pay particular attention not to inflict any injury on the edges of the eyes, or the ears, which last should not be touched rudely by the knife. Cut away



THE NECK INCISION.

the back part of the skull, with the neck, tongue, and palate, and remove the brain and eyes. The



TREATING THE WING.

whole skin being now in a condition to be cleaned and prepared, the next thing is to take away all fat and flesh, and make the skin as clean as you can ; then dress the inside with taxidermine. Bind some tow or wood-wool round the leg-bones where the muscle was, so as to restore them to their proper position.

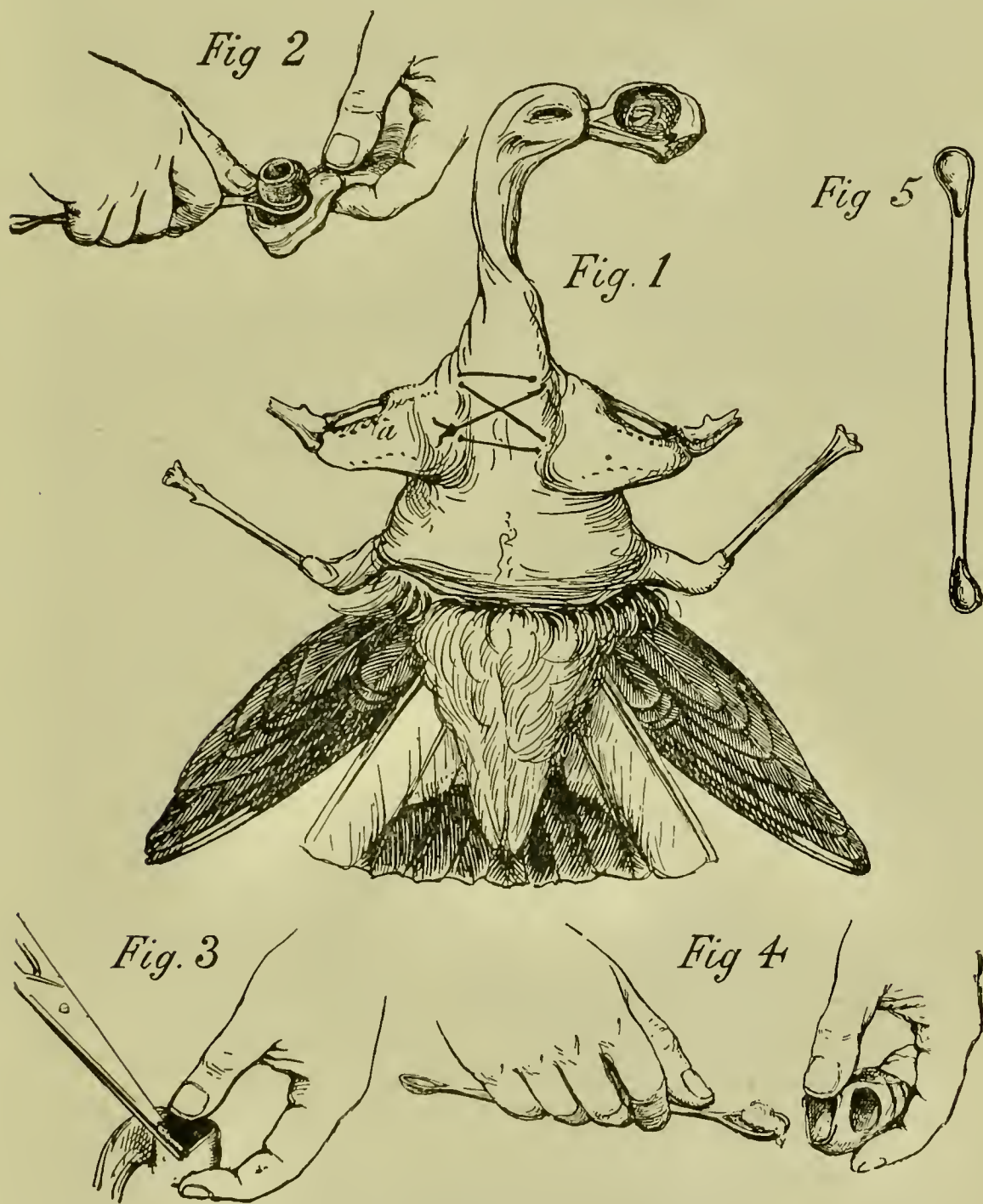
Put plugs of cotton-wool in place of the eyes, and, having forced taxidermine into the skull, return the latter to

its place. In the case of large birds—the specimen figured is a goose—the wing must be treated by opening the skin from the outside along the bones as shown on p. 59, removing the muscle, without disturbing the hold of the feathers on the bone, as the quills here join the bone. It is important to bear this in mind, for if a serious error be made here the wing will be shapeless. Small birds may be treated from the inside.

The operations necessary in preparing a peewit are shown on the cut on p. 61; the specimen having the skin reversed, and showing how the flesh can easily be removed from the inside without undue disturbance of the wing-feathers from the bone. The stitching necessary to take up the loose skin of the back is shown between the wings. A particular feature of this operation concerns the head. Carefully note that the skull in the case of the peewit, and birds of similar structure, is sufficiently small to pass through the skin of the neck entire without injury. The skull of many birds will not, however, allow of this method of procedure; but a nice discrimination will guide the operator to success in this delicate operation. Fig. 2 shows the method of removing the eye—a “gouging” operation in which the instrument represented in Fig. 5 is employed. Fig. 3 demonstrates how the skull should be cut for removal of the brain, the scissors being employed. Fig. 4 illustrates the removal of the brain with the aforesaid instrument (Fig. 5) after the skull has been properly severed.

In the case of such a bird as a grebe, the feathering of the breast—its principal ornament—is so exceptionally delicate that particular care is required in its treatment. It is better not to touch it with the knife, but the incision of the skin should be made laterally out of sight, under the wing. The illustration on p. 63

shows, *a b*, where the cut should be begun and ended ; the central figure presenting the skin reversed as taken



REMOVING EYE AND SKULL.

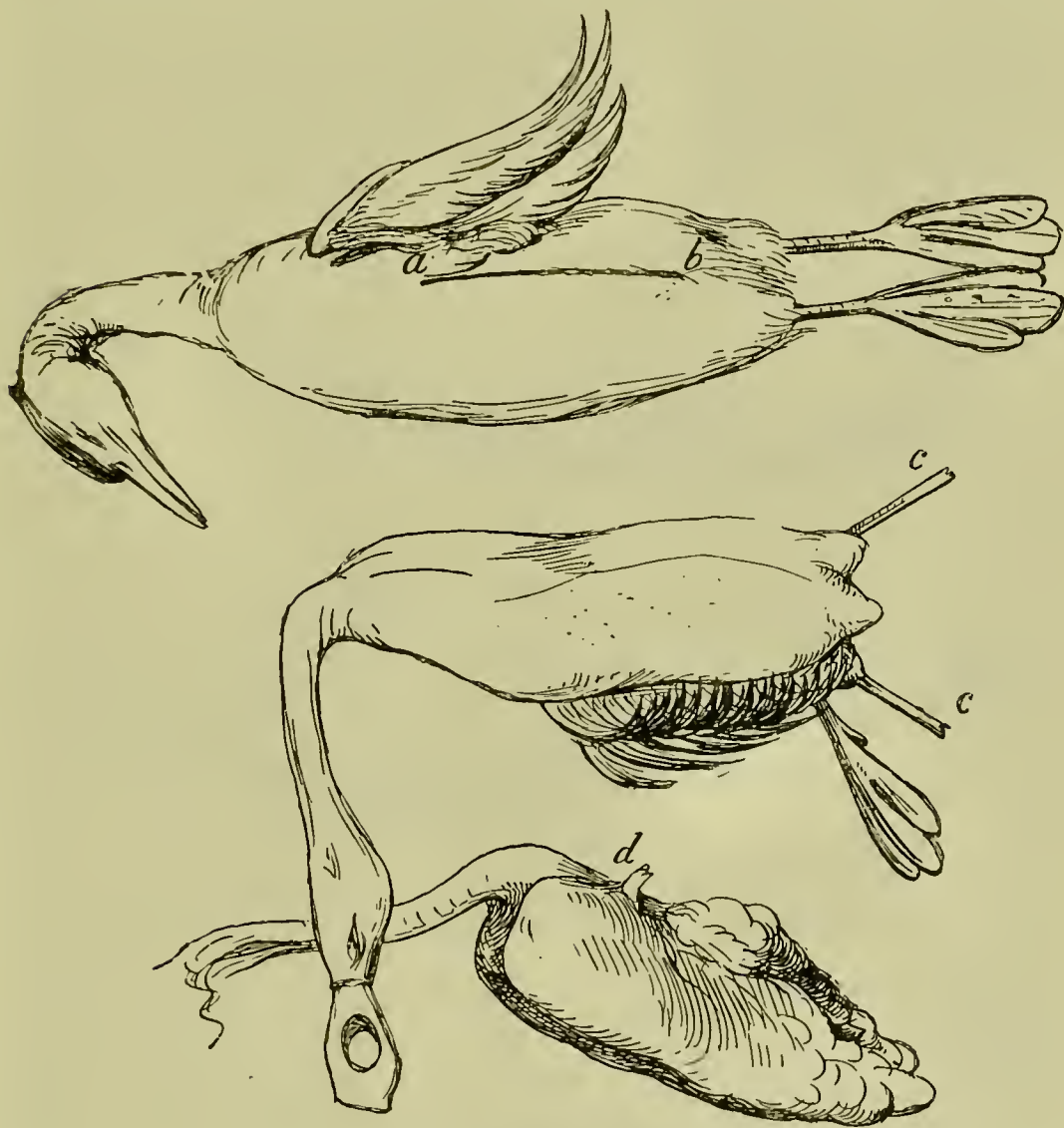
from the body, *d* ; the leg-bones (*c c*) and wing-bones protrude.

It is not desirable to apply powdered alum to bird-

skins, as it tends to make them brittle. The specimen should be filled out by stuffing to the natural size, and a band of paper placed round it in order to keep the wings and other parts in proper position till dry. During the whole operation very fine wood-dust, dry fine sand, or (if the bird is not black) dry plaster of Paris, or other dry powder, should be freely employed to absorb blood and grease, so that the plumage may be kept clean.

When the skin of a bird has been taken off in the manner set forth above, there is a proceeding which it is important to observe, technically called "making the skin." This is in reality a part of the operation of skinning, indeed that part of it which consists in finishing the work in an artistic manner. While the skin is fresh and supple it should be so disposed that as it dries it will take proper form rather than distortion; much subsequent trouble being thus saved. The skin, as it is inside-out, must be cleaned—this is indispensable—and taxidermine No. 1 properly applied. Directly this is done, it is well to sprinkle the surface with some dry powder—say plaster of Paris, so that in handling the adhesiveness of the paste may not be inconvenient. It will be noticed that the skin between the wings, when raised from the bony structure, exhibits among the quills certain bare places, which would be most unsightly if they appeared prominently in the finished specimen. The tendency of the hollow skin, at this part especially, is to be too large, and it is better for subsequent operations that it should be contracted rather than expanded to anything approaching looseness. In setting-up a bird, it is far easier to stretch the skin, if required, than to contract it; and now is the time to catch up and stow away any seem-

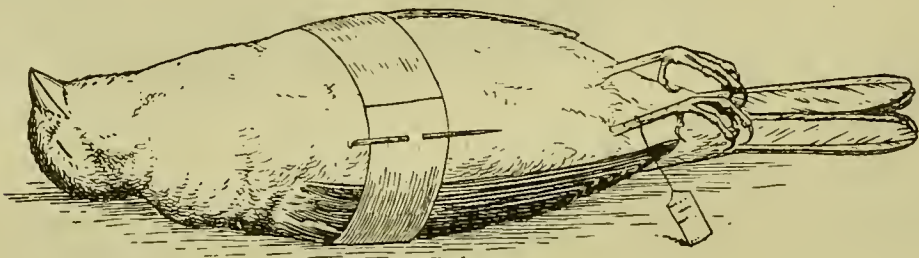
ingly superfluous folds. These are most conspicuous on the back; and to get rid of them, tie the wing-bones inside with a thread that shall lie across the back, and draw the wings together in such a manner as, in



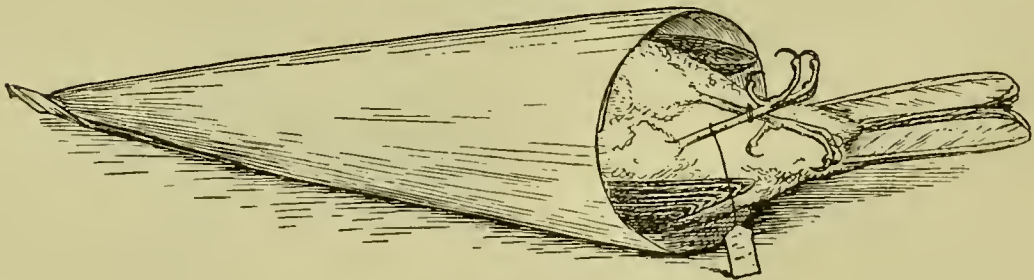
SKINNING A GREBE.

your judgment, they may best represent the position in life. This will enable the feathers to cover in the naked skin, which would otherwise appear, and will give solidity, so to speak, to the plumage at this part. This gives little trouble during preparation, but is the saving of infinite labour in the future, and is of great

consequence to the beauty of the specimen. Having done this, turn the plumage out, but be careful in doing so not to fracture the skin of the neck. Use the scissor-forceps to fill in the neck with cut tow; fill in the body, smooth the feathers into proper position, and put the whole bird into proper shape. Finally, place a paper-band round the wings, so that they may set in good position. Small birds may, however, be



No. 1.



No. 2.

FINISHED BIRD-SKINS.

conveniently slipped into cones of paper, as shown in the illustration.

No. 1 represents a skin bound round with a roll of paper, showing how to lift for drying.

No. 2 shows a skin in a cone of paper, which also forms a suitable arrangement for drying purposes, or for packing and sending to England.

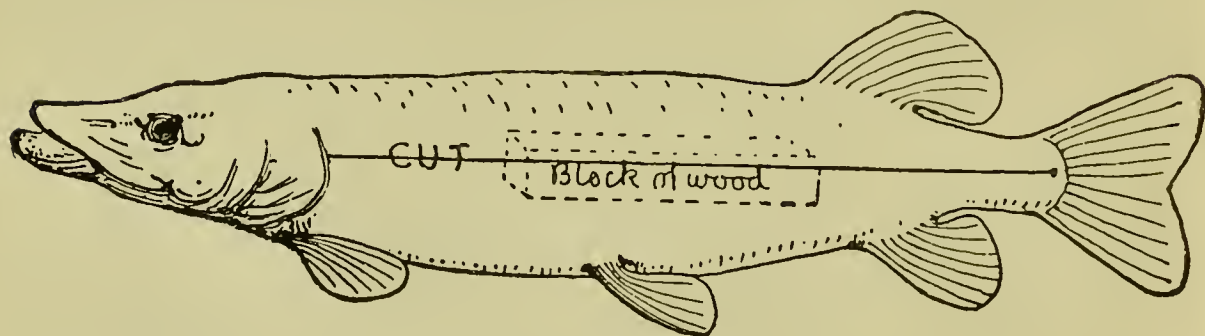
It may fall to the lot of the traveller by sea to secure an albatross, when he may not know what best to do with his unwieldy but by no means rare specimen.

If he does not care to preserve it whole, he may be reminded that there are parts which may be advantageously saved. The long tubular wing-bones, for instance, are prized as pipe-stems, for which they are well adapted; and the great webbed feet make beautiful tobacco-pouches when properly prepared, or small ladies' work-bags may be formed of the same trophies. For these purposes the wing-bones must be carefully cleaned, a good way being to open the orifice at each end, and boil them; or they may be macerated in water. The foot should be treated by severing the bone above the knee, cutting the skin down the back of the shank and heel, inserting the thumb and finger—a sharp instrument must not be used—so as to separate the web on both sides from the bony structure of the toes, and carrying this down to the outer talons, so that the toes can be drawn out of the web-pouch now formed. Next sever the talons from the bones on the inside with the scissors, leaving the talons attached outside; clean the skin neatly, dress it well with taxidermine-paste, and fill the pouch with wool, tow, or sawdust to keep it in shape. The utilisation of parts of birds and animals in this way is, of course, mainly a question of inventiveness and ingenuity; and many natural objects may be adapted to useful and ornamental purposes, while at the same time retaining the character of trophies. The leg-bones of the flamingo, which are long and have an elegant curve—form, for example, excellent pipe-stems; while the teeth of animals can be used ornamentally in many ways; the claws of a tiger, the hoofs of an antelope, the tusks of a boar, or the antlers of a deer may be employed for adornment or use; and there is this advantage, that these may in many cases be easily

saved, when the rest of the trophy has to be abandoned.

Birds may be kept in spirit, this mode being particularly useful for the preservation of nestlings in the down, very small specimens, etc.

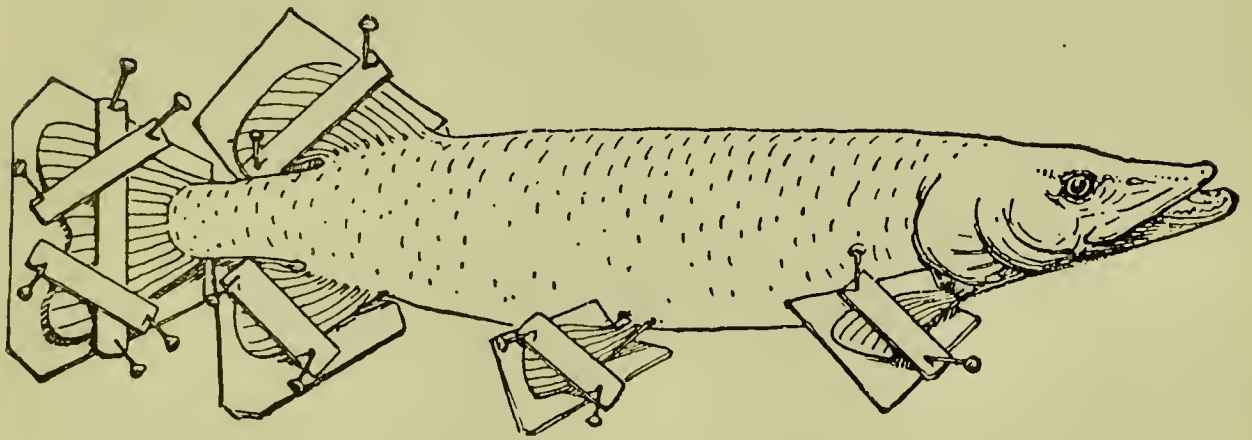
REPTILES AND FISHES.—As a general rule, large specimens are skinned and preserved in similar manner to birds, although with reptiles alum may be used, especially on the thicker portions of the skin; but small specimens are kept in spirit. It must rest with the traveller himself to determine which course is best for saving the particular example he has secured. When a fish is skinned whole, it must be laid out care-



INCISIONS IN A PIKE.

fully on a board, and the incision made, not down the belly, but along the centre of the least important side, from gill to tail. The object is to remove the body from the skin, with the least possible disturbance of the scales, etc. The skin can be manipulated neatly from each side of the incision. When, in this operation, you come to the base of fins, cut the obstruction inside the skin with the scissors, but so as not to sever them too closely, so that their attachments may not be disturbed. Cut in like manner the *vertebræ* next the base of the head and the extremity of the tail;

then, if need be, cut also those in the middle so that the flesh may be taken away in two pieces ; but this is a matter of convenience, and must be made to subserve the all-important point of not disturbing, bending, or otherwise injuring the skin, as the scales, which constitute the characteristic beauty to be preserved, are very fragile and easily detached, and to break or detach them is fatal to the value of the specimen. Clean the head as well as you can, and then paint the whole interior surface of the skin with taxidermine, and apply the same preservative to the head, into the



A PIKE MOUNTED.

cavities of which cotton-wool may be pushed. The body should be filled with dry sawdust or sand so as to restore its natural shape ; after which the edges of the orifice should be drawn together with neat stitches. The fins and tail, while wet and pliant, should be set out in natural form on pieces of card, so that they may dry as they are intended to be displayed. The specimen may now be put on one side to dry, and the sand or sawdust removed when it is dry enough.

This process, however, rather presupposes the opportunity for quiet treatment at home ; and when the

naturalist is in the field, a shorter process may be used, the skin being removed and dressed with taxidermine, and left to dry in convenient form. All the skins can then be packed together ; and it will be found advisable to pack with them some light stiff material like thin wood or dried rushes, disposed longitudinally so as to prevent the possibility of the brittle skins being accidentally bent.

A tracing of any big fish is most useful when mounting. Care should be taken with the fins, as they are apt to get very brittle, and want protecting. For this purpose it is a good plan to gum or stick thin paper, or even linen, on to the scales ; wet rushes must not, however, be used, as they will leave a mark on the fish that will remain permanently.

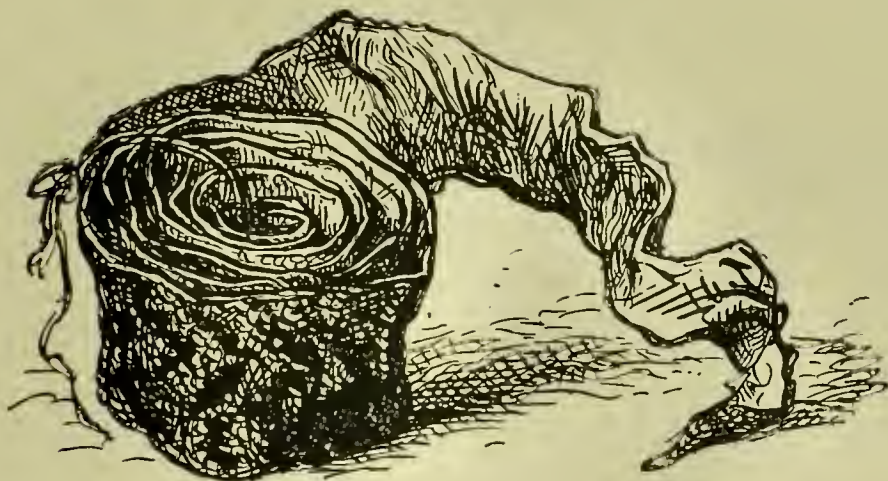
Tarpon may be saved in the same way, although a lot of work is required to remove the grease from the skin. Even in professional hands in London, to remove the grease is a difficult and expensive operation, and specimens which have not been properly cared for are useless as trophies. For convenience of packing and cheapness in transport, the specimen should be left hollow, care being taken that the fins are protected when packed. A common practice in Florida is to save only half the fish ; but when there, I had no difficulty in preserving the entire fish, as illustrated on p. 67.

In 1905 I received amongst a collection from Iceland a brace of trout and a char which had been simply skinned and put in brine, after which they were salted and brought home. They turned out first-class specimens, and were put into glass cases when mounted. Recently (March, 1911) the owner wrote to me as follows : " The fish you mounted for me are in perfect condition. I have never seen better set-up specimens."

Frequently I receive trout from New Zealand which have been in a refrigerator for months, and these mount without any special difficulty.

As regards large snakes, after the body has been removed, and the skin properly treated with preservative, it may be conveniently rolled from the tail like a ribbon, the belly-side inwards, in order to prevent injury to the scales, until it forms a small portable bale of similar form to that represented in the illustration below.

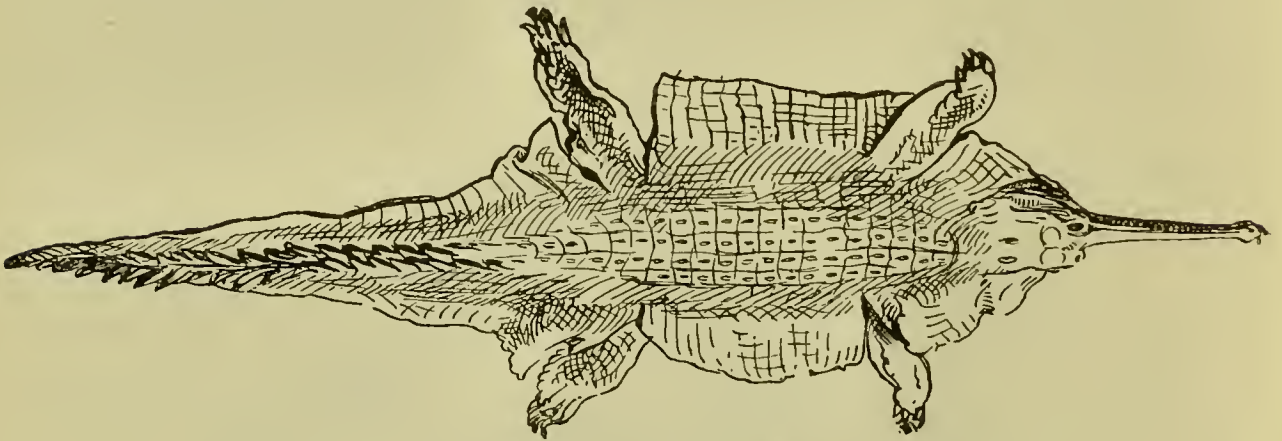
The smaller fish and reptiles, when preserved in



SNAKE SKIN.

spirit, should be saved as unaltered as possible in form, special attention being directed to preserve the natural appearance of the creature so far as may be ; and it is important that a label (of tinfoil or paper) should be attached to the specimen itself, or to the receptacle wherein it is placed, on which should be noted a sufficient description made while the specimen is still fresh, especially as regards colours and features which may disappear or be altered by the spirit, unless the species be well known and such details are unnecessary. Special attention should be paid in recording the locality where the specimen was captured.

The skull of a crocodile or gharial should not be removed from the skin, although the flesh should be cut away from the lower portion. Every atom of flesh should be removed, and the skin dried with taxidermine, alum, salt, or anything to ensure complete drying-up of the moisture and grease. For removing the latter, one of the scrapers shown on p. 72 may be employed, but great care must be exercised in the handling.



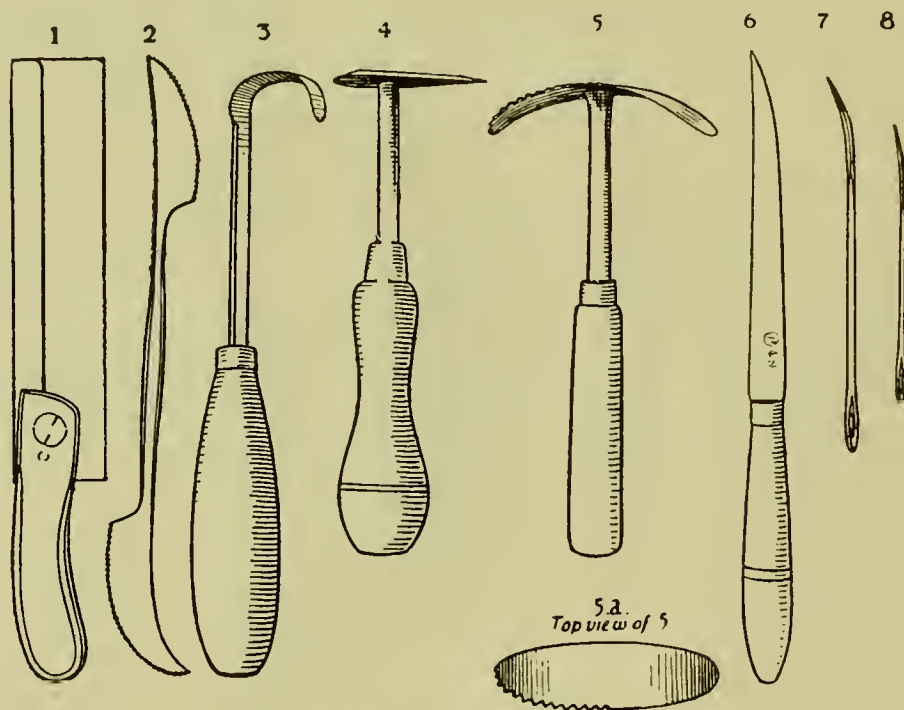
GHARIAL SKIN FIT TO MOUNT.

METHODS OF PRESERVATION

IN regard to the preservation of skins in the field, there are many recipes that might be mentioned here, but it will suffice to include only such as are of a simple nature, and which are known to me from personal experience as being efficient. If the instructions here given are carefully followed, there is no reason why sportsmen should not be able to preserve any specimens which they may have procured ; but, as mentioned in an earlier chapter, some sportsmen are apt to overlook the importance of devoting personal supervision to the preservation of their trophies. And after having incurred considerable expense, journeyed enormous distances, and made endless preparations months in advance to ensure the success of their hunting-trip, are content to leave the skinning and preservation of their game to the sole care—or rather want of care—of native followers. This should never be done.

There are two principal methods of preserving animals or their skins on the spot where they are collected till they can be transmitted for definite treatment by skilled taxidermists at home. Firstly, by means of preservative applications, so that natural decay and the ravages of insects, etc., may be prevented ; secondly, by immersion and packing of specimens, on proper principles, in spirit, pickle, etc. Convenience and desirability must regulate the adoption of the one or the other plan, and its application to

particular specimens. Animals taken whole can be dissected; and examples of supposed new species, or specimens of rare occurrence, may, at discretion, be transmitted with advantage in this manner. Generally pickle or brine preserves the natural colours of specimens better than spirit or other preservative fluid.



SOME USEFUL TOOLS.

1. Bone-saw.
- 2, 3, 4, 5. Example of scrapers.
6. Knife.
- 7, 8. Needles.

The skulls of large mammals should in all cases be removed from the skins; and it is important for the proper preservation of the skulls of *Felidæ* that they should be protected from injury to, or loss of, the teeth. This is best done as follows: when the skull has been cleaned (not too much, or it loosens the sutures) or soaked, and properly whitened, and the teeth coated with a layer of grease about half-an-inch thick, it

should be tied up in a calico-bag and placed in a separate compartment of the packing-case. Stuffing should, moreover, be put into each compartment to prevent the specimen from being shaken and injured. The wash for teeth mentioned above may be made of wax. As the tooth dries, it often splits, both in the ivory and in the enamel; wax or grease tends to prevent this action.

When time and circumstances permit, there is another method of cleaning large skulls which may be useful. Tie a rope round the horns or antlers to secure them to the edge, and cast the skull into a stream or tank. In the case of the hollow-horned ruminants, the horns will become loose, and may then be removed from their bony cores and cleaned, the skull being left in the water until the flesh decomposes, and can easily be scraped away. Ordinarily, however, it will be found that numberless small fish will be at work on the skull night and day, and will clear it of all extraneous matter if time enough is allowed.

Another method is to bury the skulls or bones after the flesh has been removed in wet sea-sand; care being taken that only the bones or skull, and not the horns or antlers, are buried. By either of these means much trouble will be saved, and the risk of insects ruining the collection lessened.

In regard to preservative applications, it may be mentioned that since the publication of the first edition of this book a strong reaction has arisen against the use of preservatives containing arsenic, which are highly poisonous. For all trophies it has long been my own practice to use a non-injurious compound of my own invention, so that the danger inseparable from the use of arsenical paste might be avoided. As its

superiority in all cases has now been completely proved, all trophies, great and small, in my own studios are treated with this preparation; and having ceased to employ or supply arsenical paste, I strongly deprecate the needless risk incurred by the use of poisonous preparations. There are, indeed, conditions under which both means fail in the hands of those who are doubtful as to their value; but no preservative is preventive of the effects of pure neglect or efficacious when there is incompetence in its application.

All specimens require occasional care for their permanent preservation; and if an owner hangs up a collection of mounted heads or skins, and leaves them without any attention for years, he must not be surprised to find the ordinary agencies of decay working ruin on his specimens. His housekeeper would not so treat her blankets or curtains, but by timely attention keeps them safely so long as they will resist ordinary wear. In like manner the mere brushing-up, and redressing with "insect-death" or turpentine, of natural history specimens retards or prevents their decay.

PRESERVATIVES IN THE FIELD.—Before referring in detail to the various methods and preparations, it may be mentioned that skins of all mammals may be effectually preserved for transmission home by using either of the undermentioned processes, but those of birds and small mammals should be treated with taxidermine No. 1 or 3. These resources, simple as they are, will be found sufficient, and have the distinct advantage that, in the ultimate treatment of the specimen for permanent keeping, there are fewer difficulties to be surmounted by the skilled naturalist or the curer of skins. When, for instance,

salt is used indiscriminately, or we have to do with the lime of native Indian dressers (the most destructive in the world), or the vegetable-curing of Australian skins, there is often more trouble to extract from the pelt the deleterious substance, in order that the process of decay may be stopped, than the specimen is worth. Skins of birds must on no account be treated with alum, or they become fatally brittle ; but when dressed with taxidermine a contrary effect is produced, and they become softened. In all cases it is essential to protect from the ravages of insects ; and for this the simplest means is the copious and judicious application of American spirit of turpentine ; but this must not be applied to birds, because it dissolves the grease that is found more or less in every bird-skin, so that the metallic colours of plumage become permanently robbed of their brilliancy, and the plumage of white birds is soiled by a yellowish stain. Where, however, there are no metallic colours to be preserved, the advantage of turpentine as a preservative may be utilised, if it be applied lightly and with skill to the surface of the feathers, and not poured over the skin, as might be done in the case of the skin of a mammal. The best way is to apply it with a saturated pad of cotton-wool.

Of late years I have received many specimens, principally from Africa and India, packed with naphthalene crystals, which appear to be a protection against damage by insects during transit.

In this connection, the powder called "insect-death," which is supplied by my own firm, may be mentioned, as its usefulness to the naturalist-traveller cannot be overrated. It is an inodorous powder, not destructive of anything but insect-life, and can

be shaken from a specimen in a moment. Bird-skins, when properly saved, may be amply dusted with this on the feathers with every confidence ; a special recommendation being that it does not emit an unpleasant odour, like turpentine. If white birds are thus treated, care must be taken that the specimens are kept from damp (as, indeed, all skins ought always to be), or there may be liability to stain. "Insect-death" is very valuable to the naturalist who stores specimens for keeping or transport ; and is a pleasant and cleanly protection for fur and feathers, and to that end should be kept and judiciously applied. After an experience of many years, I have never found an insect on a specimen dressed with this powder ; and if properly applied, it should keep any specimen free from insects, being particularly efficacious against moth.

TAXIDERMINE.—"Taxidermine," which is a preparation invented by myself, after many years' experience of taxidermy, is a perfectly efficacious, non-poisonous preservative, and is now largely used by big-game hunters and sportsmen generally. Of the three kinds, No. 2 is a powder suitable for pachyderms and other species of great game. It should be applied dry all over the pelt, in the following manner : As already stated, when the skin has been removed, the first thing to do, without loss of time, is to "flesh it," which means to carefully clean off all flesh or fat. This having been done, spread the skin hair-downwards and, unless you have a frame or other mechanical means for stretching, peg it out neatly, so as not to injure it by tearing holes. For this purpose it is a good plan to get a few dozen long iron nails made with a bent loop at top for conveniently stringing them together when not in use ; they cost little, and are neater

in use than wooden pegs. The state of the weather is a consideration in this work ; but under no circumstances should the skin be exposed to the direct rays of the sun. During the rains in India and Africa the air is charged with moisture, and it is thus difficult to dry anything by simple exposure. At such seasons, in any country, a skin pegged out would probably be spoilt, and the hair slip ; and it is accordingly advisable to use " pickle " or salt, according to the methods described in the sequel. In hot weather pegging is easy enough. As the act of drying induces shrinkage, the skin should be so arranged that as it shrinks it cannot wrinkle into folds, for in those, if anywhere, the ravages of insects, especially the bacon-beetle, will lie. In cold climates, perhaps, pegging and stretching may be avoided altogether. The skin having been spread out flat with the pelt uppermost, proceed to rub in the taxidermine. This should be done carefully with the hand so as to cover every portion, and the supply of preservative should not be stinted. It must be particularly applied to the lips, ears, feet, and other fleshy parts that have to be prepared in skinning to receive it (see p. 48). The whole pelt having been thus treated by hand, rub it with the powder till it is regularly and well covered ; and turn it over about every four hours, but always in the shade, and examine daily. The skin should be left in this state until quite dry ; the astringent that has been applied causing it to dry with rapidity. During this time it is, however, most necessary to watch it well, so that if there appear a tendency in any part of it to " taint," which would cause the hair to " slip," or come off, the preservative should be instantly applied on the hair-side, as well as on the pelt itself wherever requisite.

For small mammals and birds taxidermine can be had in the form of either paste or powder, No. 1 being a paste suitable for preserving even the most tender skins. It should be applied first to the inner side, and afterwards the powder (No. 3) can be used where necessary. The latter has a special drying property, and can be applied alone to birds. For the smaller specimens the paste should be slightly diluted and applied with a hog's-hair brush, but neither of the powders should be so treated.

In the case of small animals, in which some of the bones are left in—as, for instance, in the legs—the skin must not be pegged out; and indeed where means exist of avoiding it, do not “peg out” at all, as the skin is always somewhat injured, sometimes is irreparably torn, by that process.

WOOD-ASH.—In default of anything better, large skins may be abundantly dressed on the inside with wood-ashes, taken cold from the camp-fire. The virtue of wood-ashes really consists in their detergent properties; for, containing as they do a large proportion of potash, the fat in the skin is thereby converted into soap, and sometimes in this condition is immediately brought away by the hand, or the scraper (see p. 72). And as a preservative, excepting under difficult conditions, the effect is cleanly and good. There is, however, a great difference in the quality of ashes, dependent on the kind of wood employed. Oak is one of the best; and the harder the timber burnt, the better is the ash produced; and as hard wood presumably contains a high proportion of carbon, this acts as an excellent absorbent for the fluid matter in the hide. Ash has but little astringent properties, and the main factor in the preservation of ash-cured skins appears to be

plenty of dry air. The ash should not be applied too thickly, but rather rubbed off every day, and a fresh quantity applied. Skins preserved in this way should be first well reduced in thickness, and during preservation should be well protected from rain. To attempt to finish a skin by drying it before a fire is little or no use. If the fire is hot enough, it will partially cook one side and possibly singe the other, while if at a reasonable distance, it may slightly warm the skin, but not sufficiently to cause much evaporation. The skin should be folded in the manner described in connection with the salt treatment, and protected against the attacks of beetles.

Of vegetable substances, gum-kino, oak-bark, willow-bark, catechu, powdered nutgalls, or any such material rich in tannin is available; and strong spices, or strong tobacco powdered, will keep off insects.

SALT.—Treatment with salt is one of the oldest methods of preserving skins and hides, and my friend, Mr. R. J. Cuninghame (whose experience in preserving skins on the field is probably second to none), has kindly written the following notes on the subject. The process is especially popular in America, where, owing to the overheated houses and generally dry atmosphere, the after-effects are not often observed; but in England, where for several months of the year the atmosphere is charged with moisture, the salt-cured skin presents many real difficulties:—

“When the skin is nicely prepared, and freed from blood and mess, spread it out, hair-side downwards, on a tent, floor-cloth, or other suitable and handy object, label it with a leather tag—not metal—and rub salt carefully and unsparingly all over it and into every

fold, and especially the ears, hoofs, eyes, nostrils, etc. Not a square inch must be left without salt, or slipping of the hair in that part will result. Having completed this to your satisfaction, fold the skin with the legs, head, neck, tail, and the edges of the under surface inwards, arranging the layer of salt in the folds and under the reflected portions. The skin now has a rectangular form, with portions of the hairy side of the legs and neck upwards. Apply salt to these, and then roll up the skin as firmly as possible from the neck-end, and leave it for twenty-four hours. If you are in a stationary camp, turn the skin over so that the top becomes the lower surface twelve hours after it has been rolled up. Next day open the skin and examine it carefully, with a view to ascertain whether the salt has acted on every portion, for if by any chance a small area has been missed, there is imminent danger of the hair slipping. Special attention should be given to the lips, nostrils, and eyes, and also to the insides of the ears, the feet, and the tail. If all looks well, rub in the unabsorbed salt, and fold up the skin again in the same way, taking care not to repeat the same folds, but shifting them an inch or so forwards or backwards. Then roll it up again and leave it for another twelve hours, turning it over, and examining it at the end of these second twenty-four hours. By this time the action of the salt will usually have thoroughly permeated the skins of such animals as deer, antelopes, lions, tigers, or bears, irrespective of climatic conditions (excepting extreme cold); and a thorough overhaul of the skin should be now made, or, if more convenient, at the end of the third day. If all is in perfect condition, place a little more fresh salt all over the skin, arrange the folding of the legs, head, neck,

tail, and under side symmetrically, and then roll up the hide neatly and tightly, sew it up in sacking, and the field-work is complete.

“Treatment of the above nature is perfectly sufficient for all soft-skinned animals, although the neck-skin of such large species as eland, oryx, wapiti, and moose should always be pared down a little. When, however, we have to preserve thick-skinned beasts, such as rhinoceros, buffalo, hippopotamus, giraffe, and elephant, it is absolutely imperative to reduce the thickness of the skin by laboriously paring it down to such an extent that the action of the salt will be speedy and effective. If it is intended to secure and preserve entire specimens of large mammals, considerable forethought, followed by rapid and continuous work, is necessary ; but if, as is more usual, only the head and neck are desired as trophies, the matter is much simplified, though the routine remains the same. If the climatic conditions are hot and damp, putrefaction is more rapid than if the air is hot and dry, but it must always be remembered, in the case of thick, heavy skins, that although a hard, dry, and sound surface often forms on the inner side very rapidly, and the epidermis also appears to be thoroughly cured, there is a variable thickness of sub-cuticle in which putrefaction is progressing, and is doing so all the more rapidly when the two outer surfaces appear thoroughly sound and free from taint. Under such conditions the gases resulting from decomposition cannot freely escape, and as the epidermis is furnished with pores, leakage of these gases permeates slowly through the epidermis, which consequently ‘slips,’ and produces serious damage. In order to obviate this, it is advisable when a definite hunt is being made after

any of the above-mentioned large animals, to have with you a salt-supply of, say, 20, 40, or 60 lbs. Usually the pursuit of really big game takes the hunter far away from his camping place ; and if, for example, an entire skin of a rhinoceros is desired, it is obvious that it could never be brought to camp by native transport, and the camp has therefore to move to the kill, so that there may be a delay of many hours. In such cases the salt carried during the hunt is invaluable, and directly the skin is removed from the carcase, it should be sprinkled freely with all the salt available. If, on the other hand, only the head with the neck is required as a trophy, it can always be carried back to camp, except, of course, in the case of that of an elephant. The portage may be a long one, and the climate may be hot or damp, but whatever may be the conditions, it adds greatly to one's peace of mind if, immediately after skinning, the scalp receives a dose of salt, and is then packed and reaches camp in a satisfactory state, owing to the chemical action of the salt on the skin. Work on the skin should be commenced on arrival in camp, but if this is impossible, a good layer of salt should be rubbed in and the skins rolled up.

“ For an entire elephant-skin 240 lbs. of salt are necessary ; and the parts that first require attention are the nose, lips, ears, and eyes. These are handled in a similar manner to those of any kind of lesser game ; but on these parts being dressed, the entire skin must be pared down and reduced in thickness to about a quarter-of-an-inch. During this most necessary operation (which takes many hours to complete in the case of the skin of the head and neck, and some five to six days when the entire skin is saved) do not remove

the salt ; and, as a guide to the amount of paring down that can be safely done, do not reduce the thickness if a decided bluish colour shows up, as this indicates that the knife is getting near to the upper layer, while, besides the danger of cutting through the skin, you are slicing off the base of the hair-follicles, so that the hair will be loosened and become liable to be shed, though the epidermis itself may be perfectly preserved. When the paring down is finished, or if a cessation of work is demanded before this is finished, apply and rub in a liberal quantity of salt, and roll the skin up. In the latter case continue the paring-down later on ; but bear in mind that the sooner this can be completed, the safer is the skin. Subsequently follow the routine examinations as previously detailed.

“ The trophies preserved in this manner with salt on the field will remain in the condition in which they were sewed up in sacking for many months, if necessary ; and no further thought need be given them, except that they should be kept under cover as much as possible, and not needlessly exposed either to sun-heat or drenching rain. If they are likely to experience much wet weather, a covering of Willesden canvas may be substituted with great advantage for ordinary sacking.

“ On arrival at civilisation the skins require packing for rail and shipment, when the only safe method is to place them in barrels filled with brine. As a matter of precaution, those skins that have not hardened to such an extent as to render the unrolling of them impossible, should be opened and examined for the last time. The reason for this is that should, by any chance, some small area in any one skin be not thoroughly impregnated with salt, slow decomposition might be developing, or climatic conditions might be inducing

mildew. Both these conditions indicate that active micro-organisms are in process of development, and if a skin be so affected, there is danger that sound skins may become infected. Accordingly, all skins that are not too hard to handle should be opened, and any doubtful specimens isolated, although with careful initial treatment not 3 per cent of salted skins should prove imperfect.

“New barrels (about 60-gallon size is the most convenient) should be employed for packing the skins, as they will have to bear very considerable strain. Second-hand barrels are always untrustworthy, in addition to which it is often difficult to entirely remove the remnants of their previous contents, and animal-skins are particularly liable to become permanently stained by certain wines and oils. In stowing away the skins, first of all make up an absolutely saturated solution of salt and water. Take the skins out of their coverings, and carefully, neatly, and tightly pack them, rolled up, in the bottom of a barrel. Throw over them about two pounds of coarse salt, then arrange another layer of skins, add more salt, and so on until the barrel is quite full. The bung-hole in the side must be strongly plugged with wood before packing the skins, but the cork-hole in the barrel-head should be left open.

“When the barrel is full of skins and salt, pour in as much of the brine-solution as it will hold; and apply firm and continued downward pressure, by the hands, to the upper layer of skins. This will cause the air imprisoned in the folds of the skins to escape, and allow the brine to take its place. After the air has been thus expelled fit on the head and tighten the hoops, pour in more brine-solution through the

cork-hole until the head of the barrel is submerged, and then leave for two days. At the expiration of that time add, if necessary, more brine-solution, plug up the cork-hole, and test against leaking. When this last operation is completed, it may be considered that the specimens and trophies are perfectly safe for many years under every condition.

“As regards the kind of salt to be used, and the advantages and disadvantages of salt-curing, the following points may be noted :—

“In the first place, salt acts quicker, is more easy and satisfactory to handle, is by no means so wasteful, and, weight for weight, has more absorbent qualities if it is fine, evenly ground, and pure. Ordinary table-salt gives the most satisfactory results. Coarse, rock, or native salt locally ground by native methods or by hand-machine, serves equally well, but its action is not so uniform. Salt has the effect of extracting all the blood from a skin, and as the retention of blood hastens the process of putrefaction, it has this advantage over other preservative agents. If any fat be left on a skin, chemical action takes place when salt is applied, and a peculiar slight yellowish stain results. If a carefully prepared salted skin is exposed to fierce sun-heat (though protected by being sewn up in sacking) it sometimes sets up a caustic action, to the detriment of the hair or fur, but this seems to occur very rarely. No beetles or insects of any kind ever touch skins preserved in salt. Salt (of some description) is readily obtainable almost anywhere. As a rough estimate, about 5 lbs. of fine salt is sufficient to preserve the entire skin of an animal the size of a full-grown domestic sheep, but for large pachyderms this estimate should be doubled. When travelling in wet climates, the loads

of salt should be sewn up in green Willesden canvas. Of all preservative agents, salt is the most nearly perfect, as any sort of skin once thoroughly prepared and kept impregnated with salt will remain in as perfect a condition for ten years or more as it was ten days after the completion of its preparation, but, like many other good things, the salt-process is the most expensive.

“Finally, reference may be made to a process whereby skins are treated with salt and subsequently air-dried. After the skin has been thoroughly cleaned and prepared, salt should be applied for forty-eight hours under exactly the same conditions as with the former process. After this the skin is to be freed of all salt by vigorously shaking it, and spreading it out on stones, logs of wood, or branches, to dry in the shade. Raising the skins on branches, etc., allows the circulation of air underneath. On no account must the skin be dried in the sun, unless in high northern latitudes where the rays are comparatively weak. According to the degree of rapidity of the evaporation of the moisture, the skin should be folded or rolled into the shape it is required to assume before its pliability has departed. The time of complete desiccation varies according to climatic conditions, but the skins require watching for at least a week under the most favourable circumstances ; and this process is not to be recommended in moist climates, or during the rainy season in tropical regions, as the skins dry fitfully, and show a decided tendency to ‘sweat,’ so that it is then extremely difficult to succeed in drying them perfectly. The skins of short-haired, soft-skinned animals are best suited for this process, since dense and shaggy coated skins require much care in drying and in pre-

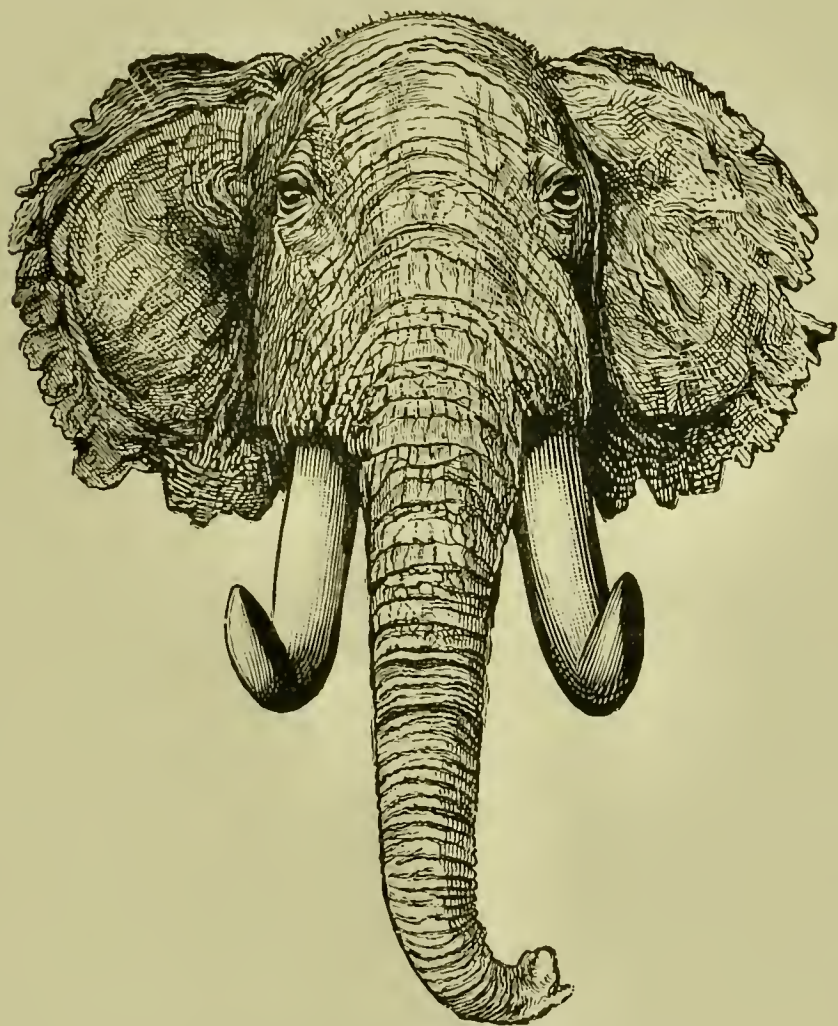
venting the 'sweating' condition from becoming almost chronic. Even this phase need not, however, be viewed with much alarm, although the sooner it is checked the better, for the skin is continually absorbing moisture from the air, and consequently the contained brine is having its saline percentage lowered hourly, and this weakening becomes in time dangerous to the epidermis. Unlike those preserved by the wet salt process, salt-dried skins are liable to the attacks of beetles and moths, so that the dry process is not to be recommended for the preservation of pachyderms and other very large skins."

Although I have given Mr. Cuninghame's notes on the salt-process in full, I consider it important to mention that it is one which requires the most careful attention, and, when used, should be attended to personally by the sportsman. If the salt is not put on uniformly, the hair will be sure to "give," and the skin become useless. I do not recommend the dry process being used in a hot, damp climate; but, particularly from East Africa and the Polar regions, I have received many trophies preserved in brine which have turned out quite successful. The hides of animals with very thick skins, such as elephant, rhinoceros, hippopotamus, walrus, etc., can be preserved with salt, but I recommend sportsmen who have had little or no previous experience with this process to employ with it an astringent like powdered alum, for the purpose of keeping on the epidermis, and assisting in drying any portion of the skin at the hair-roots that may be inclined to "slip." The alum should be put on both sides of the skin. I may also mention that in modelling specimens preserved with salt, it is often

very difficult to cleanse them, as the removal of all the salt by fresh-water baths is necessary, and if the completed trophy is to be kept in a hot, damp climate, where there are heavy rains, or much moisture in other forms, the skin is apt to "give" afterwards. Trophies modelled in my studios are dispatched to every country in the world, and for each country particular methods of treatment are necessary.

PICKLE.—Another process that is frequently most convenient on shipboard or in certain other circumstances is that of "pickling"; and it may be mentioned that I have received large numbers of skins of sea-elephants, seals, Polar bears, elephants, rhinoceroses, etc., which have been preserved by this method, and have turned out excellently, although, of course, all the salt has to be removed before modelling. In this process the skin having been removed from the carcase and cleaned, instead of being laid out for drying, should be thickly covered over the flesh-side with some preservative, the lips, eyelids, feet, etc., being particularly treated; then it should be folded in a convenient form, and immersed in a barrel of brine, or what is technically called "liquor"—in fact, a mixture of alum and salt dissolved in water, in the proportion of 6 lbs. of alum and 3 lbs. of salt—sea-salt if possible. Dissolve both in a small quantity of hot water sufficient to make a gallon, and let the liquid cool before the specimen is immersed. The skin must be sweet and fresh at the time of placing it in pickle, or the operation will not succeed; and the vessel must be kept closed. A number of skins may be placed in the same barrel, which, when quite filled and closed, is ready for storing or transit. If it be more convenient to make the package lighter for travelling, the skins,

when they have been thoroughly pickled for a few days, may be taken out, spread open, dried, and then repacked. This, however, is an operation obviously requiring great judgment, as if it be imperfectly carried out the consequence may be ruinous.



AFRICAN ELEPHANT HEAD.

A conspicuous exemplification of the advantages in this process of brine-pickling was afforded by the great elephant-trophy brought from South Africa by the late Duke of Edinburgh. In this case the process was carried out in the following manner. The entire skin of the mighty beast was preserved ; the animal

being undoubtedly one of the finest examples ever brought to this country of the African species. The height at the withers was 10 ft. ; from tip of trunk to tip of tail, 23 ft. 5 in. ; girth, 16 ft. 6 in. ; from top of head to end of trunk, 11 ft. 3 in. ; circumference of head, 10 ft. ; from ear to ear, 9 ft. ; length of ear, 4 ft. 6 in. The skull and tusks weighed more than 3 cwt., and the skin of the head when taken from pickle weighed 3 cwt. 6 lbs. The weight of the whole skin when taken from the brine was 20 cwt. 7 lbs. ; and the weight of the entire elephant in the flesh was 4 tons 8 cwt. 4 lbs. On the field the skin, having been duly prepared, was folded in this wise : the flanks, with the skin of the legs and feet, were folded inwards, each half-way, so that the inner surface or flesh-side was outwards ; then the skin of the head was in like manner turned back, the trunk being arranged longitudinally down the centre between the edges of the flanks ; and the tail-end with the nether extremities was similarly folded back to meet the trunk. The whole skin was then rolled as tightly as possible round the head, and carefully tied at both ends of the bale. In this condition it was placed in a great barrel, which was completely filled with liquor, and properly coopered for transmission to this country. On arrival in London, when the head of the barrel was removed, the perfect success of this mode of transport was at once apparent. There was no unpleasant odour ; and on taking out the mass and unfolding the skin, it was noticeable that every part of the surfaces had been properly acted upon, and there was not a single tainted fold. When received, it had been upwards of a year in the barrel. The old pickle was removed, the skin was refolded and restored to the barrel with a supply of fresh liquor, and the cask was

re-coopered. In this manner the skin was preserved for upwards of three years more, until it was decided how this great trophy should be treated. The magnificent head was modelled and mounted in the Ward studios, and is now in Clarence House; the feet (which supply an index of the size) were utilised for ornamental purposes, while the hide was cut up and converted to various uses; a considerable portion being made into walking-sticks, that formed appropriate mementoes of the Duke.

FORMALIN.—During the last dozen years I have received many specimens preserved with formalin, but I cannot advise its use by amateurs, as it leaves no gelatine in the skin, and renders specimens useless for mounting. It may be used in museums for preserving specimens in bottles, but not on the field for preserving skins and hides. This is no hasty judgment, as I have tried it on specimens in a hot country and have made experiments extending over four years, but at present mounted formalin specimens are not to be compared with those saved by other methods. Bait for fishing is preserved with a solution of 20 to 1. To any one desirous of experimenting I may suggest a small freshly killed bird being put in a solution of 300 to 1 in an uncorked bottle or jar. Some specimens immersed in this solution absorb the formalin much quicker than others. If the skin in a month is tough or brittle when dry, it is, in my opinion, useless for mounting. Care must be taken not to get formalin on the hands, as, like carbolic, it acts very quickly. If the specimens, such as molluscs, etc., are to be kept permanently in it and not wanted for mounting, formalin will be found economical and useful. As a preservative for marine animals, its great bactericidal qualities prove it to be

a powerful antiseptic. Formalin is said to contain 40 per cent of formic aldehyde. A solution of from 3 to 5 per cent is a very useful one, but I may warn operators that specimens preserved in this manner are of little if any use, although I should be glad to hear the result of any experiments in other parts of the world.

It may be added in this place that a number of other mineral and vegetable astringents, besides taxidermine, powdered alum, carbolic, or salt, can be used, in case of need, as preservatives ; among these being saltpetre, powdered green vitriol (sulphate of iron), ordinary borax, and boracic acid.

CARBOLIC POWDER.—I have recently had prepared a new carbolic powder, which will be found very handy on account of its portability. It is equal to 50 per cent of No. 5 carbolic acid, so that a solution of 1 in 40 is equal to 1 in 80 of the No. 5. It is easily soluble either in hot or cold water, but the former is the best. It can also be used dry if mixed with an equal proportion of dry sand, wood-ashes, powder, mould, or other suitable substance. It is also supplied in cakes.

CARBOLIC ACID.—Calvert's No. 5, diluted with 65 parts of water to 1 part carbolic, is a very useful preservative for big game, provided it is well stirred before the specimen is put in. I have kept fresh-skinned specimens in this way for several years, and it is used very largely in our studios. It is advisable to constantly test the strength of the solution if kept in use, as each specimen immersed weakens its preservative properties.

When carbolic is employed, the solution should be used in either lead, wood, earthenware or glass vessels, but not zinc or glazed earthenware. The best way

to mix the solutions is to put the amount of carbolic required into a quart of *warm* water and well stir it ; and while the solution is being stirred the amount of water necessary to reduce the solution to the required percentage should be added. In this way the carbolic will be thoroughly incorporated ; otherwise, if any acid should remain on the top of the water, it may get into the hairs and burn or curl them to such an extent that they can never be made to resume their proper shape.

The specimen should be plunged in the carbolic as quickly as possible, as this will at once prevent any risk of the hair slipping, which in hot countries may occur within a few hours after death, when the specimen will be rendered useless.

A little powdered alum may be put into the warm carbolic solution if desired, which will hasten the action of the preservative.

If any raw carbolic acid should fall on the skin, it must be promptly wiped off with a dry cloth, and the affected part rubbed with oil or glycerine ; water must not be used. A cloth moistened with alcohol is also efficacious for removing the carbolic acid before using the oil or glycerine. If taken internally by mistake, sweet oil and castor oil should be at once administered in large doses, and a medical man sent for if possible. Other antidotes recommended in case of accidental swallowing carbolic are raw eggs, a solution of $1\frac{1}{2}$ ozs. of lime and 6 ozs. of sugar dissolved in a pint of milk promptly administered, and afterwards strong coffee or tea ; milk, if taken at once in copious draughts, will also counteract the effects of the acid.

If a skin preserved with salt is afterwards put into

a carbolic solution, the salt must be thoroughly washed out first, as the salt tends to make the carbolic less soluble in water.

When collecting in the field it may be found convenient to carry a tin containing carbolic solution for the reception of small specimens, such as stags' feet, pieces of skin, etc. The liquid should be strengthened at least once a fortnight by adding No. 5 carbolic, as the acid is absorbed by each specimen put in. Some skins take more carbolic than others; this depending on whether or no there is much fat; hence I cannot insist too strongly on proper attention being paid to seeing that the liquid is kept up to a proper strength.

If lime, ammonia, or other alkali is used with carbolic, there is a possibility of discoloration, due to oxidation by the air. And if skins are washed in soap the same effect may be produced, as many of the inferior kinds of soap retain a considerable amount of free alkali.

The following particulars with regard to No. 5 carbolic acid and the carbolic powder may be found useful. One gallon of No. 5 weighs about 10 lbs., and the addition of 65 gallons of water (representing a solution of 1 in 65) will make the weight of the liquor as prepared for use about 660 lbs. As regards the powder, to make the same strength, 10 lbs. would require to be added to $32\frac{1}{2}$ gallons of water, or half the quantity of liquor which could be made with one gallon of the No. 5 liquid carbolic.

TEMPORARY PRESERVATION OF BIRDS.—When a bird cannot be skinned directly, and the process has to be delayed, make a cut, say, under the wing, open the mouth and immerse the entire specimen in the

carbolic solution so as to allow complete permeation. This will keep the bird safely till it can be skinned. Powdered carbolic mixed to a proper strength is efficacious and much more portable.

If carbolic is not at hand, the birds may be put in spirit of 15 to 20 per cent overproof, which will keep them for a week. The best plan is to tie a piece of string to the leg of the bird and hang one end outside the can or bottle, so that the specimen can easily be pulled out and examined. After a week the bird should be put in a stronger solution, where it can be kept for a month or more. The bottle or can must be tightly closed, so as not to allow air to get to the spirit (see also p. 98).

FISHES.—The proper preservation of fish is undoubtedly a matter of considerable difficulty; and naturalists are perhaps not generally aware how few examples of foreign fish reach this country in a condition that admits of effective treatment, or how special a branch of the art it is to set them up effectively and well. The common processes are: (1) to plunge and bottle them in spirits; but the effect of this on the evanescent colouring, as well as on the natural contour of the specimens, is disastrous; (2) when they are skinned (see p. 67), to apply dry powder preservative, taxidermine No. 2, for preference, to those parts where the flesh cannot be perfectly removed, so that it may be dried, and to apply taxidermine-paste on the inside, for preservation of the skin.

Fishes, together with snakes and other reptiles, may also be skinned and put into brine, then salted and sent home, as mentioned on p. 69; this process doing no harm to the appearance of the specimens when mounted.

REPTILES.—The skins of crocodiles, alligators, and other large reptiles having been removed (see p. 70), may be manipulated as follows. Clean them of all flesh as completely as possible ; but as this cannot be done properly about the head or the feet of a large example, taxidermine, or even alum powder, must be applied copiously to these parts, in order to dry up the flesh as much as possible. The roof of the mouth should be cleaned, and the tongue must come away. In the case of smaller specimens which can be skinned over the skull to the lips, a similar application must be made where it seems necessary. To the inner part of the skins taxidermine No. 1, or wood-ashes, may be applied ; but such preservatives are not nearly so essential as in the case of mammals. Indeed, turpentine to preserve them from insects will afford nearly all the protection they need. The skin may be rolled or folded for transmission. With snakes, the skin dried flat should be rolled from the tail like a ribbon, the belly-side inwards, in order to prevent injury to the scales (see p. 69). Small specimens of any species will go in spirits ; and carbolic will be found a useful agent in cleansing reptiles.

PACKING AND TURPENTINE DRESSING.—The following observations may be read in connection with Mr. Cuninghame's notes on p. 80 : When the skin is dry it must be conveniently folded, hair-side inwards, for packing, that is if it be of large game and requires folding. First turn the hair-side up and pour turpentine freely over it till the skin is thoroughly anointed. In the case of long-haired animals it is important that the turpentine should reach the roots of the hair ; the inside should also be sprinkled, although it is not necessary to anoint this so fully as the fur. It is well,

when convenient, to put some dry material in the folds to prevent contact between the inside of the skin and the fur ; and, as occasion may serve, the skin should be unfolded and inspected, and more turpentine or preservative applied if necessary. In this process the astringent powder is applied to preserve the skin, and the turpentine—American is the best—to protect it against insects, and to prevent them laying eggs. The ravages of these latter pests in a hot climate, such as India and Africa, are indescribably vexatious, and should be carefully guarded against.

The principal marauder is a beetle about a quarter of an inch long, of a dark, dirty colour, with a transverse



THE BACON BEETLE AND ITS LARVA.

band of dull yellow ; it does not often fly, being generally more busily engaged on carefully collected skins, but can do so. Its common name is the bacon beetle, and its scientific designation *Dermestes lardarius*. Being such a terrible enemy to skins, it is important that it should be recognised at once, and its life-size portrait is therefore given on this page. Now this insect does not like any spirit, and the one spirit it really dreads as fatal to its constitution is turpentine. In cold climates benzine and other spirits are sometimes used, and with efficacy, but these evaporate more rapidly in warmer temperature, and turpentine, if only because of its less rapid evaporation, is at all times to be preferred.

I have sometimes unpacked trophies to discover the hair entirely removed from the pelt by the ravages of

the Dermestes ; and in like manner I have received skulls in London that have been imperfectly cleaned of flesh, from which I have shaken hundreds upon hundreds of fattened lively specimens. I gave them the turpentine they should have had when the specimens were packed. Not only skins, but all skulls and horns should be saturated with turpentine before they are shipped to England ; every atom of flesh being removed from the skulls. Sometimes the insects will recover activity after the milder influence of benzine ; but the process described above is quite sufficient for pachyderms. All skins should be well looked after at night, as during the darkness, animals of various kinds, including half-starved village dogs, frequently lurk about a camp, and nothing comes amiss to their hungry maws.

IMMERSION IN SPIRIT.—A few words must be devoted to this mode of preservation, for there is absolute necessity that it should be properly carried out. Either fishes or reptiles, or even birds, that may be sent home in spirits, should be treated in the following manner : First provide a tub, or other convenient vessel, full of the spirit, wherein the specimens can be put as a preliminary measure, so that the mucus, water, etc., may be drawn out of them. Before placing them in this, a moderate incision should be made, with as little disturbance as possible, in the belly, so that the spirit may permeate all parts. Keep the specimens in this spirit from a week to ten days, then transfer them to fresh spirit, and let them remain there for about two weeks more, before final removal to the vessel or vessels of spirit in which they are to be packed for the remainder of the journey. Reptiles, being less watery than fish, generally require only one change. The first tub of spirit may be used for more

than one set of specimens, but will of course decrease in strength by the addition of the water drawn from them ; the second spirit should be stronger ; the third quite strong enough to be readily inflammable. The specimens will then be safe for more than six months. For small mammals, proof-spirit, diluted about one-half with water, is perhaps the best to use, but rum or gin serves well. The specimens may be packed for transmission in great numbers in the following manner : Wrap each fish or reptile in a piece of linen or cotton rag, and arrange them so as to rest closely in a suitable vessel that can be filled completely with spirit. A wooden packing-case, well lined with tin, which can be hermetically soldered up when quite full of the liquid, serves well. Among insects, beetles can be transmitted in spirit. The native spirit " daru," called by Europeans " native liquor," and sold in all the bazars in India, will do well instead of rum, etc., for preserving reptiles. It is very cheap. Besides the above, or when they are not attainable, benzoline may be used, but requires judgment.

A convenient method for carrying small mammals, deers' feet, birds, snakes, etc., in spirit is to procure some zinc boxes about $12 \times 6 \times 18$ inches high, and fitted with a round opening at the top about 4 inches across, which should be closed with a screw-cover furnished with a ring of rubber or leather fastened round the margin so as to fit tightly. Each box should be placed in a closely fitting wooden case with a lid secured by hinges and a bolt and furnished on two sides with handles of leather or rope. From two to four of these boxes should be carried. The spirit should be kept fairly strong, and must be occasionally renewed, as each specimen put in absorbs some of

the spirit. Ordinary empty tins will do, so long as the covering is air-tight. The specimens should be put first in the box containing the weaker solution (not less than 10 under proof), and after a day or two put in the stronger solution, of not less than 10 over proof, where they can remain until sent home in air-tight receptacles, the spirit in which should be at least 20 over proof.

Specimens which show distinct signs of putrefaction must be thrown away, as they endanger the whole contents of the box. If slightly decomposing, a solution of common salt (a tablespoonful to one pint of water) should be poured into the mouth or injected into the interior of the specimen.

COLLECTION AND PRESERVATION OF INSECTS.—The ingenuity displayed by the collector in capturing and storing insects is often a personal quality, and the methods that may be adopted are almost infinite. The general methods most approved are all that can be referred to here. Butterflies, moths, and certain other insects, whose beauty is in their colouring, and which are very fragile to the touch, must be treated for storage and preservation in a different way from beetles and insects of similar durability. In fact, all excepting the first-named may be preserved in spirit so soon as captured for after-treatment, and need not be injured by the process. For permanent display in the cabinet, all insects must be properly set out—Lepidoptera with distended wings, and Coleoptera in suitable position. They should be killed the instant they are captured, to prevent injury resulting from efforts to escape. A gauze-net is generally used. When a butterfly has been netted, the collector watches his opportunity while the insect is still in the gauze,

Fig. 8



Fig. 4

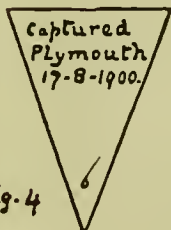


Fig. 1

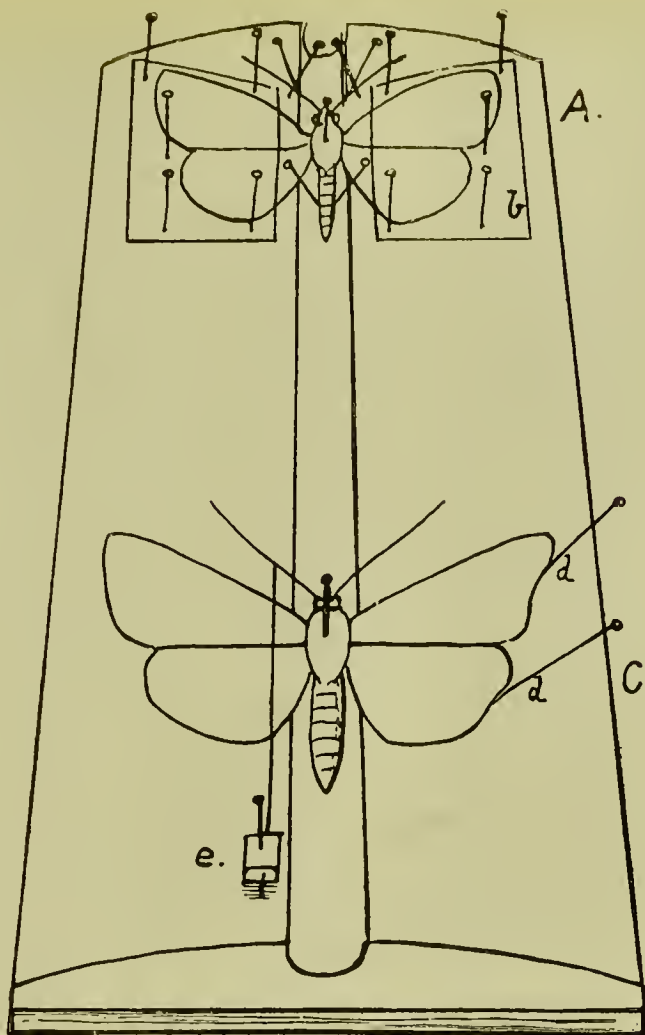


Fig. 2

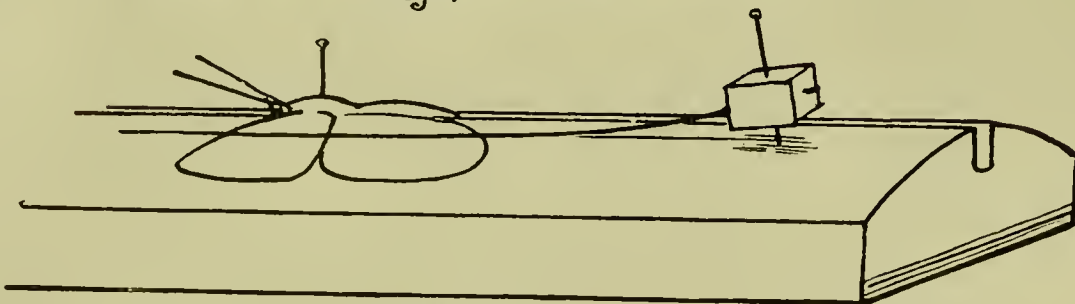


Fig. 5

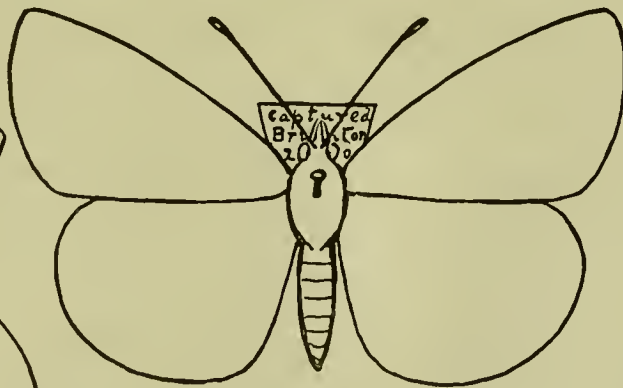


Fig. 6

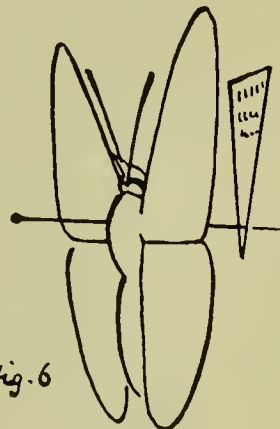


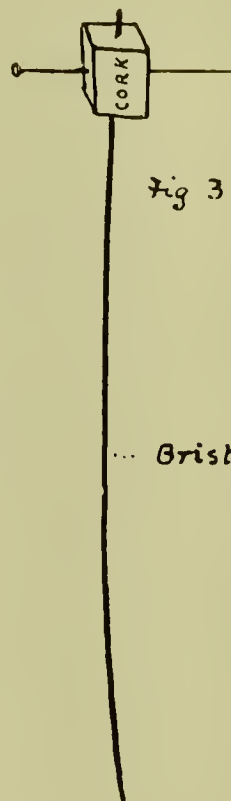
Fig. 7



Fig. 9

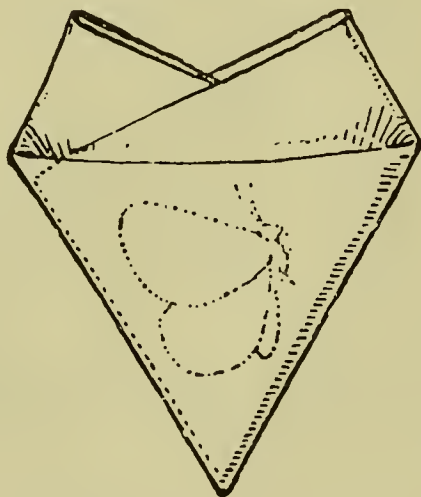


Fig. 3



Setting Lepidoptera

and so soon as it closes its wings he lightly but sufficiently pinches its *thorax* between his thumb and forefinger, as shown in Fig. 5 of the illustration on p. 105. The butterfly falls from the net dead and uninjured. The specimen must not be handled except to pick it up by the legs, while holding which the wings may be slightly blown apart and a proper pin pushed through the body, so that the specimen with closed wings may at once be stored in the collecting-box, or, if the insect be not quite dead, the pin can be inserted on the under



BUTTERFLY IN ENVELOPE.

part of the cork in the cyanide-bottle, and the specimen kept there till dead.

When in the field, economy of space in the collecting-box may be attained by impaling several butterflies on one pin ; the pin going through the side of the under part of the thorax, so that the insects lie flat over one another on the pin (Fig. 13, p. 105).

Butterflies should be stored thus with folded wings, until they are required to be set out for the cabinet. When the collector reaches home, he can store the contents of his pocket-box, by putting each specimen

in a small triangular envelope of paper, outside which a note may be made. Hundreds can thus be stored in small space. A very simple envelope for storing Lepidoptera may be made by folding the paper after the manner shown in Figs. 1-4 of the aforesaid illustration. Moths, on account of their greater rotundity, must not be treated in exactly the same manner by pinching. Cyanide of potassium is necessary to kill them. The bottle should be of the shape shown in Fig. 6 of the illustration. Put a piece of wash-leather round the cork to prevent evaporation. The cyanide is placed in a layer at the bottom, and a layer of plaster of Paris mixed with water put on top. This of course hardens, but the fumes of the poison will nevertheless permeate into the upper portion of the bottle.

Moths are conveniently taken home in separate pill-boxes. Beetles, etc., may, as a rule, be preserved in spirit, which kills them forthwith; or they can be killed in the cyanide-bottle. When the time arrives for arranging insects for the cabinet, the butterflies can be relaxed by placing them for a time on wetted sand, or exposing them to steam.

The most satisfactory way of setting butterflies and moths is to procure some stiff bristles, stick them through small pieces of cork, and insert pins through the corks to attach them to the setting board, as in Fig. 3 of the illustration on p. 101. These bristles hold the wings flat on the setting-board, and the wings themselves are carefully slid into position with a very fine needle. Pin pieces of paper or thin cardboard over the wings to keep them in position until the object is dry and stiff. Two methods of paper-bracing are exhibited in the illustration on p. 105, Fig. 2 showing a single paper covering both wings, and Fig. 10

small pieces of paper for each wing. The former is the best, as it prevents the tips of the wings from curling up in drying. The antennæ and legs are to be pinned out; the position of the pin through the thorax is shown in Figs. 11, 12 (p. 105).

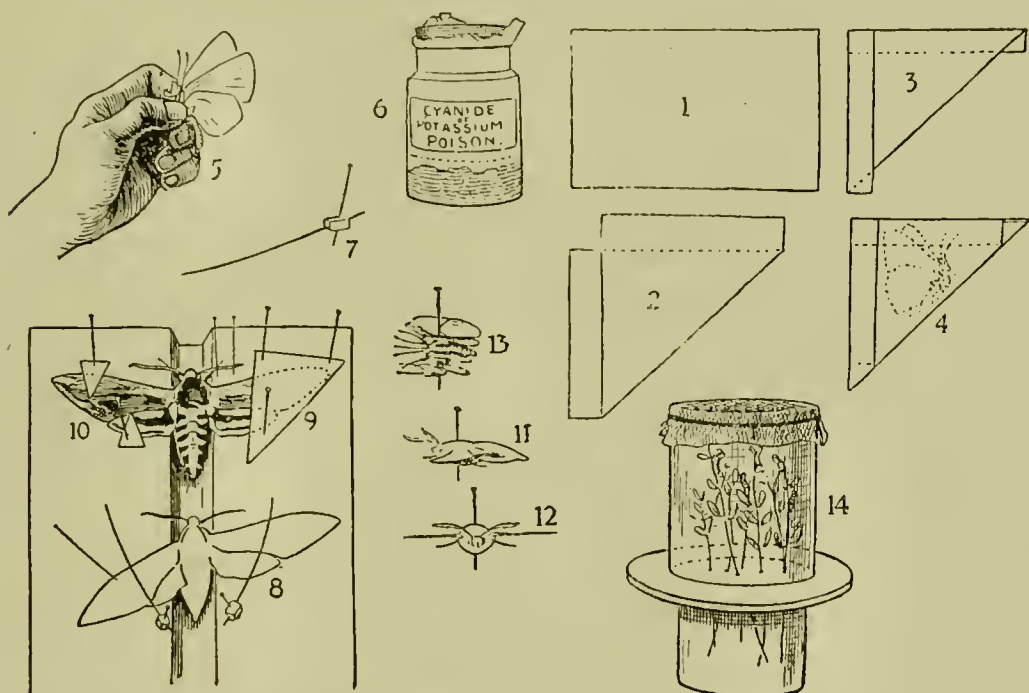
Beetles, etc., should be set while they are wet when taken from the spirit.

In England, as well as on the Continent of Europe, many entomologists study exotic species obtained from friends or correspondents residing abroad, either in the *ovum* or egg state, or in the chrysalis or *pupa* state. Most people know that from the eggs (*ova*) of butterflies and moths come out caterpillars or *larvæ*. These *larvæ* moult several times, and after each moult, in some species, there is a remarkable change in the colour of the *larva*. The *larvæ* of many species of Lepidoptera burrow into the ground to change into the *pupa* state, and sometimes form a shell in the ground; some turn into *pupæ* in leaves, others on the ground in a sort of web. The *pupæ* of butterflies are most often found on grasses, twigs of shrubs, or on trees; others on walls or fences.

The *pupæ* of many species of Bombyces are enclosed in cocoons most often found on trunks, and especially on branches of trees. Some of these cocoons are remarkable for their size and the beauty of their silk. When the leaves of the trees have fallen, these cocoons are easily seen hanging from the branches. In some species of Lepidoptera, the two sexes of the *imago*s (perfect insects) are very much alike, but the body of the male is larger than that of the female. Male moths among the Bombyces have the *antennæ* (horns) much more pectinated than those of the female; the body of the latter being also generally much larger. Persons

wishing to rear the *larvæ* should keep the moths in cages, in order that the eggs may be secured.

With respect to the rearing of the caterpillar of large Bombyces, the following plan may be adopted till the second or third stage. Use large bell-glasses, with a few holes in the dome, or glasses open at the top, which must be covered with gauze. Place these glasses on saucers full of sand covered with pieces of



MATERIALS FOR BUTTERFLY SETTING.

paper. Through the paper stick into the sand some branches of the food-plants proper to each species. Place the caterpillars on these. Under bell-glasses, which, of course, must be placed in the shade, no water is required to keep the little branches fresh, and the young caterpillars, which are apt to wander till the first or second moult, cannot escape. When the caterpillars are large, it is best to rear them on branches plunged in water, without the glass covering. This refers to the rearing of the large silk-producing Bom-

byces, and of all those forming some sort of cocoon. When the caterpillars have to bury themselves to change into *pupæ*, it is of course necessary to rear them in a box containing a few inches of mould. This method should always be adopted when the habits of the *larvæ* are not known. Breeding-cages, which, as a rule, should be large, must have their sides of perforated zinc to give air. Cages ought to open by the middle, like two boxes open on one side, and placed one over the other, and fastened by hinges.

A simple caterpillar-feeding cage, shown in Fig. 14 of the illustration on page 105, is a glass-cylinder formed by cutting the bottom out of a glass jam-jar. Place the cylinder on a piece of wood, with a few holes bored in it to take the stalks of the food-plant. The whole apparatus is then put on a jar of water, which keeps the plant fresh ; and a piece of gauze tied over the top. Very small caterpillars should not be put in the jar, as they are apt to crawl through the holes in the wood and so get drowned in the water below.

When *pupæ* have to be sent to England from distant countries, especially if they have to cross the tropics, they may be conveniently transmitted in small strong boxes by sample post ; each box not to exceed eight ounces, and to be registered, with the stamp placed where the cancelling will do no harm. The *pupæ* should be sent as soon as they are formed ; and if underground in habit, should be placed in soft, damp moss. The boxes should also have a few holes in the sides to admit air.

If boxes containing *pupæ* or *ova* of Lepidoptera could be placed in the ice-house on board ship, which would considerably retard the emergence of the butterflies or moths and the hatching of the eggs, valuable

species might be sent from distant countries. Salmon *ova* were thus safely forwarded from England to Australia and Tasmania.

PRESERVATION OF INSECTS.—The majority of insects having been properly stored as directed, require little more than a supply of camphor, naphthalene, or cyanide of potassium, to protect them from decay. If mites appear in them, the best means for destroying the intruders is benzoline or best motor-spirit. Some very large moths, butterflies, and beetles require a different treatment. In such cases the body must be opened by a longitudinal slit on the side not intended to be displayed, and as much matter removed as can be got away without impairing the specimen. The cavity thus created should be completely dusted with taxidermine No. 3, and the incision neatly and skilfully closed over it; a small but sufficient piece of cotton-wool being introduced to preserve the shape.

ARTISTIC SETTING-UP OF TROPHIES

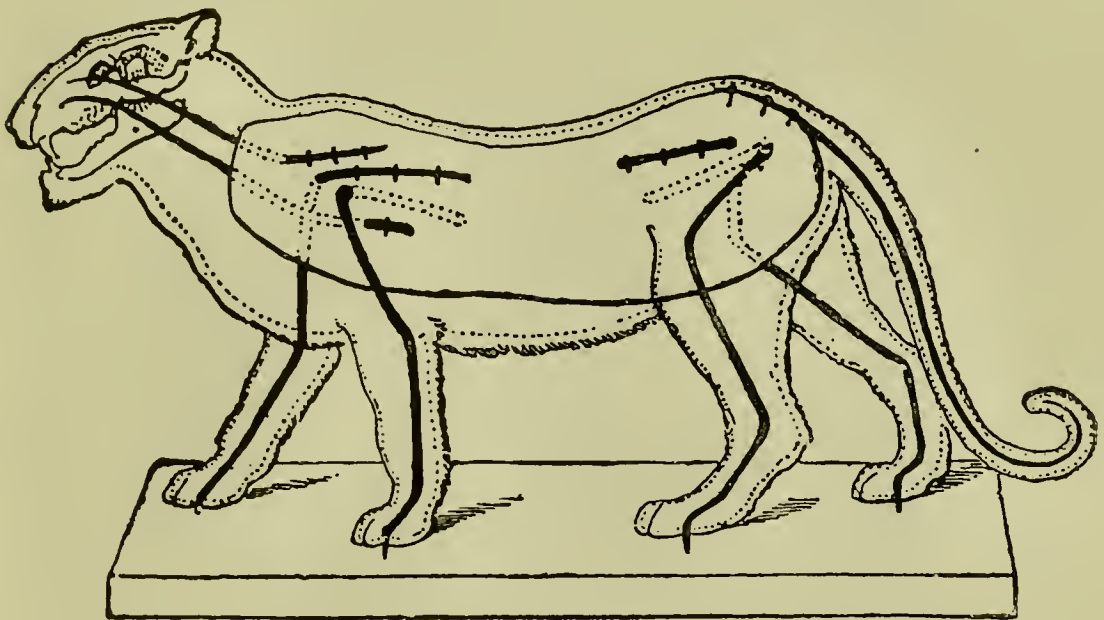
IN order to reproduce the life-like form of any animal by the perpetuation of its natural features, not only technical skill, but knowledge and artistic feeling are necessary to the production of a satisfactory result. Formerly, the process aptly termed "stuffing" was employed. The results were seldom or never of a very high value, especially in the case of mammals. The fact was too often ignored that the use of astringents, necessary to preserve a skin, invariably distorts it, and that this distortion differs even in several parts of the same skin, by reason of the varying thickness or even the condition of health in which the animal was killed. The skin of a fat animal is, for instance, liable to undue expansion, that of a poor beast, to peculiar contraction ; and mere stuffing can give only an untrue representation of the living creature. It is therefore incumbent upon the operator, firstly, to make himself thoroughly acquainted with the habits of the animal in a state of nature ; and next to choose some incident of the creature's living existence which he desires his specimen to illustrate. This will enable him to arrive at his design. He must then make himself acquainted not only with the bony, but also with the muscular structure of the animal ; and by the aid of such knowledge he may, if he have the requisite technical and artistic skill, produce a *model*, whereon may be placed the skin and

other parts of the specimen in such a manner as to make as perfect a representation as practicable of the living animal in form and detail. This is the only means whereby noble trophies can be made to have more value than a paper description of them would possess. On the individual skill, knowledge, and taste of the artist depends the real value of the work—in the same way as that of the sculptor, or painter, is to be estimated.

A typical animal to illustrate the propositions laid down above is the tiger, on account of his various and picturesque habits, magnificent proportions, and great beauty. I shall, therefore, describe the setting-up of a specimen of this feline in detail. But here a qualifying observation must be made. No book-description can adequately convey all that should be known. To learn what is necessary the personal instruction of a good teacher, and the smallest modicum of experience are worth more than any printed course of instruction, however ostensibly complete. We will suppose, then, that a perfect skin, in good condition, has been procured. Let us select the simplest action of the creature, viz. his stealthy walk through a grassy jungle, when his peculiar expression is that of constant caution, whether he be in retreat, or advancing, with the snarl of ready offence which is habitual to him. This is the design. In common with other digitigrade quadrupeds, all members of the cat tribe walk on their toes, and the claws, being retractile, are then concealed. The left hind leg and the right fore leg, or vice versâ, are used together in progression. Instantaneous photographs can now be purchased from which may be learnt many features indispensable to the home-worker. There is a difference in the pose of

the ear to express alertness, caution, or anger. In the first case the ear is erect; it is partially depressed when the beast is only cautious, but in anger, or incipient anger and alarm, it is levelled with the skin of the head. We will choose the semi-depression. The mouth should be partially open, showing the teeth and tongue, but the lip not raised, the expression being that of slightly panting. In order to produce this design, first study the skin and form a judgment of its natural dimensions, as to height, bulk, etc. A special preparation of the skin is necessary as a preliminary to this. It must be what is technically called "shaved" or "fleshed." This process consists in first softening the raw skin—which is very often native-dressed with lime—by sponging the inner side plentifully with liquor. The skin is then placed conveniently on a rounded beam, and what is termed the "pelt" removed by scraping and shaving with a currier's knife, the edge of which is turned specially for the purpose. Great care must be exercised in this operation, or the edge of the knife will often go through the skin and so damage the hair-side. This shaving, by reducing the substance of the skin, renders it elastic and better adapted for use on the model, which must now be constructed. The head, with the lips, eyes, and cartilage of the ears, as well as the feet, must be carefully shaved with an ordinary knife, skilfully manipulated. Now fold over the skin with the hair outwards, so that the limbs accord with the intended position; measure the points, and make the best estimate possible under the conditions as to bulk, etc. The limbs should be folded, and the whole arranged so as to give as nearly as may be the outline of the animal.

In making the model, first deal with the trunk. Two $1\frac{1}{2}$ -inch boards, 11 inches wide, of proper length, should be glued, and what carpenters term “dowelled” together by the edges. Place the skin as folded to represent the animal flat on this board, and from it draw thereon the outline of the trunk. Cut the board to this outline—to the inside of it, so that room be allowed for the modelling of the muscles on this framework. Get four iron rods— $\frac{5}{8}$ -inch is the medium



“MANIKIN” FOR A TIGER.

gauge—for the legs, one for the tail, and two to support the head. Bore a hole through the board where the *scapula*, or blade-bone, would come. Through this pass the rod till about 15 inches are on the other side, then bend this portion sharply round at right angles, to be fastened by staples firmly along the board in the direction of the hind quarter. At about 3 inches from the board bend the rod again, and incline it forward at such an angle as represents the natural position of the *scapula*; then bend the rod back again

for the *humerus*, and once more forward for the *ulna* and *radius*, then shortly for the carpal and metacarpal bones. This is the extent of the rod, which must now be taken through a wooden stand and fastened beneath. It will be seen that this iron, which must be repeated exactly on the other side, is intended to take the place of the absent bones, and that it must stand out from the board at just such distance as the original bones would have occupied. The hind legs should be treated in similar manner (see diagram). The iron for the tail must be bent to the required shape, and attached to the board in position; as also the two irons to support the skull, which must now be attached.

The next operation is to model with "wood-wool," now largely used for packing. Bind firmly with hemp. Coarse wood-wool may be used to start with, and the model finished with the finer and softer quality. I had this substance first made for this particular purpose many years ago, long before it came into general use for ordinary trades. When finished, the whole can be covered with clay, which allows an amateur to make alterations if required at the time. I use a particular substance of my own invention for modelling, which dries as hard as marble without any shrinkage, and is never brittle. The first group, "The Combat," that I was able to produce by this means, was exhibited in the International Exhibition (1871), in Division III (*Scientific Inventions and New Discoveries*).

The body must be built up so as to be light and hollow, but with a suitable surface to receive the clay. The iron support for the tail is covered with wood-wool, neatly bound on to the required form. The same material is also extended over the skull, whereon

the fleshy excrescences must be properly represented by wood-wool. We have thus a complete light framework. On all necessary places over the whole framework a surface of modelling clay is to be worked. The ribs and prominent muscles of the trunk, the muscular development of the shoulders and haunches, the joints and extremities, must all be carefully modelled

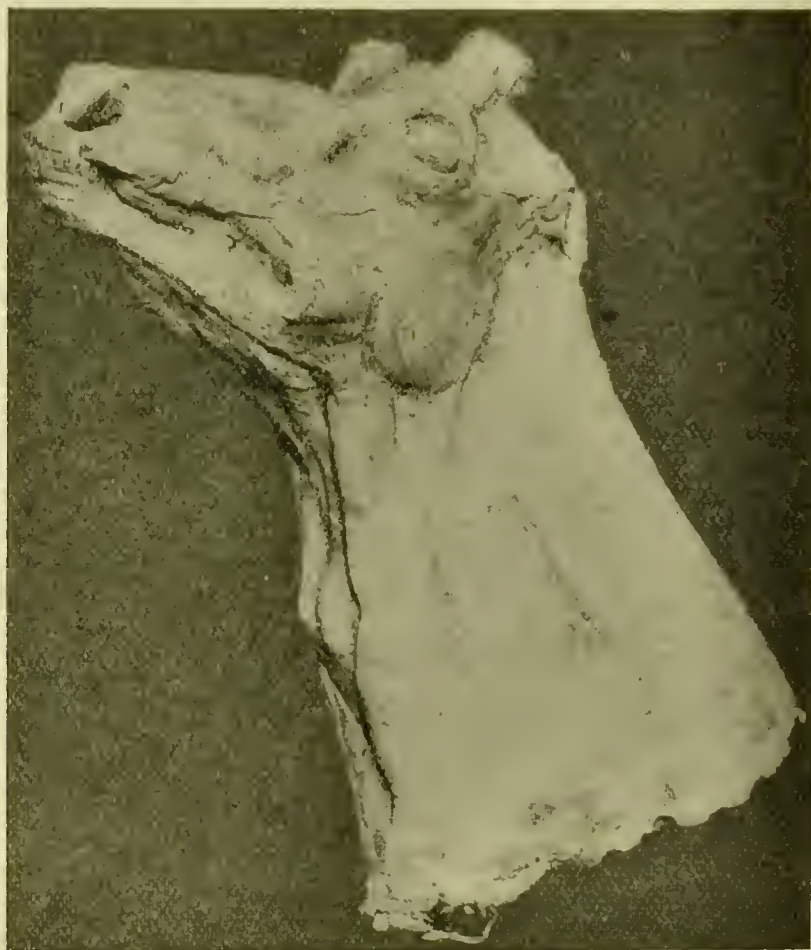


SCENE FROM THE JUNGLE (INDIAN AND COLONIAL EXHIBITION, 1886).
DESIGNED BY ROWLAND WARD.

on. Ordinary modelling clay is used ; and when the model is finished, and nearly dry, paper should be pasted over the clay to prevent it from breaking away. A good method is to perfectly steep brown paper in a pailful of hot paste. The softened paper can be put in small pieces over the clay, and readily adheres.

Pulp can be used if preferred, made from old paper torn into shreds, rotted, and boiled down in a copper. A pot of the thinnest glue and a pot of paste made from

thin flour may be added. After boiling add carbolic acid, say a cupful of carbolic to a copper-full of pulp. Mix all well together. It should be kept as thick as possible, even by adding more paper, as the water is of no use. Then add plaster of Paris sufficient to make



“MANIKIN” FROM FLESH DEER’S HEAD,
TO MODEL FROM.

the pulp as thick as a cook’s pastry. This pulp can be used in place of the clay, or for stopping. It will set very hard, and can be pressed into a mould in any thickness, and filled up with sawdust or sand until dry.

The model is now complete and ready to receive the natural features of the animal. First of all the

eyes must be carefully adjusted in a natural manner ; the claws must be next inserted in position. It remains to place the skin, which must be again damped with liquor till quite soft, and in this state carefully arranged on the model. First manipulate the head, paying particular attention to adjust the lips, eyelids, and ears properly, so that the required expression may be secured. It is advisable now to tack together the edges of the skin in certain places, as under the throat, the four joints under the armpits and at the groin, midway under the belly, at intervals along the tail and the limbs. Adjust the soft skin to the inequalities of the model, using a " piercer " and the thumb. The seams must be carefully and neatly sewn up. A delicate and important operation remains. The skin should fit perfectly all the indentations of the model, and in order to attain this, the skin, when worked wet into the recess, should be secured wherever necessary by drawing-pins, which must not be withdrawn until the model is perfectly dry. Then, the pins being removed, the fur can be cleansed in the usual way, viz. by rubbing with the hands very fine mahogany dust all over the coat, and finishing with a brush. The tongue, which is modelled in paper coated and plated with glue, and tinted, should now be placed in the mouth, where the tinting can be finished. At the same time the lips, eyes, and nose can be tinted and finished. The pigment used should be the finest tube oil-colour. It is best before painting to cover the mucous surfaces with hot wax, which promotes the naturalness of the appearance most materially. The whiskers which may have come away from the skin should be carefully replaced, and if missing, imitation ones can be made from seal-whiskers.

Accept it as a golden rule never to cut the skin.

The method described above is given on the supposition that the skin is in the condition ordinarily received from India, cured by native practitioners.



A TIGER FROM THE COOCH-BEHAR,
TROPHY MOUNTED BY ROWLAND WARD.

When possible, the skin should be dressed by a professional ; and in cases where the skeleton is preserved and is available, much of the work may be saved by utilising the bones, especially those of the limbs ; and in any case they furnish the true proportions of



STUDY OF A CHARGER'S HEAD.
Modelled by Rowland Ward.

“Look, when a painter would surpass the life
In limning out a well-proportion'd steed,
His art with nature's workmanship at strife,
As if the dead the living should exceed ;
So did this horse exel a common one
In shape, in courage, colour, pae, and bone.
. . . . He was my friend.”—SHAKESPEARE.

the animal, which are so difficult for the inexperienced operator to arrive at without them.

The mounting of head-trophies is best achieved in the following manner. If the head has been received in pickle, the skin should be thoroughly cleansed in cold water, and directly afterwards shaved on the flesh-side, as directed in the case of the tiger-skin. Whether it be the head of a tiger, a stag, or a bison, the process is the same. A proper estimate must be taken of the length of neck. What is called a neck-board must be prepared accordingly ; that is, a framework to which the skull is to be attached, and whereon the skin of the neck can be distended properly. This board is a flat piece of inch-deal, 11 inches wide, cut to the shape of the neck, as the central board is shaped for the body of the tiger. The construction is on the same plan, the form being modelled in like manner. This neck-board is fixed to a heart-shaped back-board, by means of which it can be hung against a wall. The skull and horns having been firmly fixed on the artificial neck, the skin should be placed on the model and carefully adjusted. In well-prepared trophies the seam should be up the nape of the neck, and the throat intact. The nostrils, lips, and eyelids of the stag or bison should be moulded with particular care and artistic feeling, clay being injected between the mucous and outer skin of the lips, nostrils, and eyelids, so as to give them the rotund, fleshy appearance they have in life. It is better to insert the eye in its orbit before the skin is drawn on. The ears must be manipulated into shape while they are drying ; and when the specimen is dry it can be cleaned in the usual manner.

Among small mammals the squirrel will serve as an example ; and in this instance I shall presume that

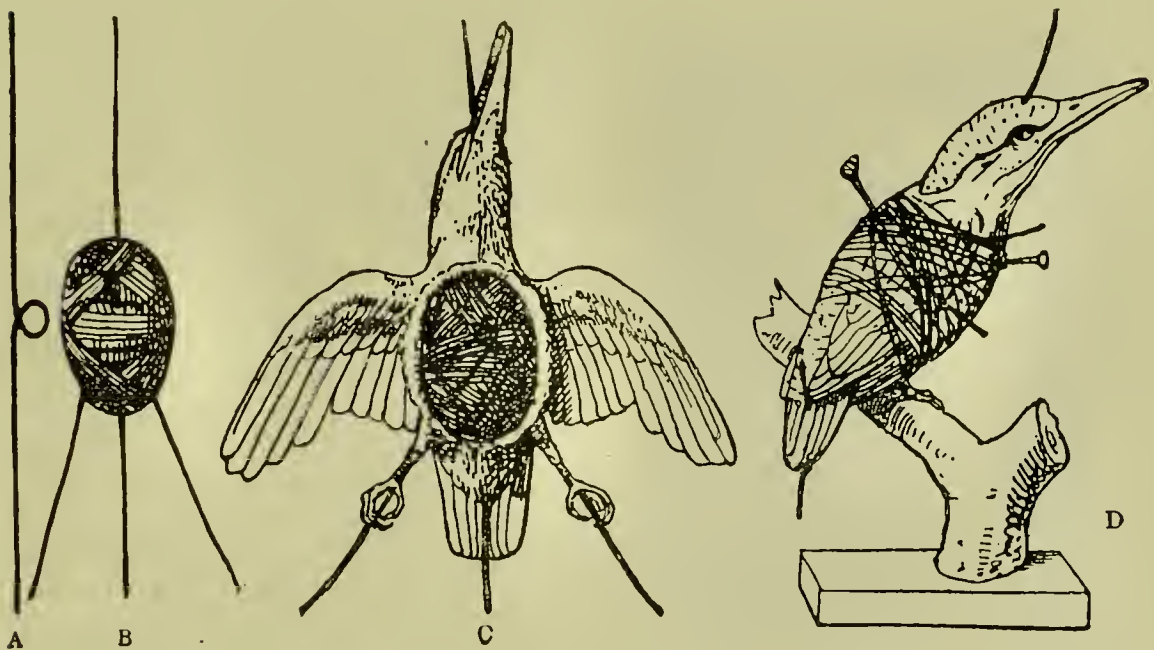
the skin has just been removed from the animal in a fresh condition, according to the method fully described on p. 47. It is always an advantage to set up a skin while it is fresh. Annealed iron wire of various sizes will be required, and can be obtained at an ironmonger's. Sizes : Wire, 1 to 5 for large animals ; 13 and 14 gulls, pheasants, etc. ; 15 and 16 partridges, grouse ; 17 and 18 thrush ; 19 and 20 dunlin ; 22 finches ; 24 tits. Prepare a body-wire about 12 inches long, and of the thickness of ordinary whipcord ; cover this with fine wood-wool to the size of the carcase that has been removed, and bind the wood-wool neatly with hemp ; in fact, shaping it as nearly as possible to represent the form of the body. For a sitting position, bend the wire so that the artificial body has the natural arching of the back. The end of the wire next the tail must be turned and concealed in the body. Certain stitches through with a long needle will assist materially in shaping the form and strengthening the frame. A wire covered with the requisite quantity of wood-wool will form the tail ; and four wires, each about 8 inches long, will be required for the limbs. Pass these wires severally through the fleshy pads of the extremities, and bind the bones to the wire with cotton, taking care to leave about 2 inches of wire beyond the *humerus* and *femur*, so that they may be passed into the frame of the body and clinched. Next fill out each limb by carefully binding wood-wool in proper proportion round the bone. Never exceed the natural size. The bones having been returned to the skin and the limbs completed, the upper end of the body-wire should be cut so as to protrude only an inch, and then inserted in the skull, the whole skin meanwhile being turned over the skull. A stitch driven through from eye to eye will

fasten the head securely to the artificial neck. Small portions of wood-wool are to be inserted where the flesh has been taken from the skull, which can then be returned and the skin drawn into its position. The limb-wires can now be inserted in the body and clinched. The skin having been properly drawn over, the edges may be neatly sewed up, the limbs bent to their natural position, and the wires of the feet passed through a stand so as to be secure. It will be found advisable to manipulate the skin with the "piercer" and thumb, in order neatly to adjust it, and finish the specimen to taste. The eyes should next be inserted by adhesive glue-paste; but the fur should not be cleaned till the skin is quite dry.

Reptiles may be treated in precisely the same manner.

BIRDS, when the skin has been properly removed and dressed, as directed on pp. 52 and 62, should be set-up in the manner following. Choose the best side of the specimen to show, or if it only has one leg, place it as if sitting. Should the feathers on the neck be bad, mount your bird as if asleep. For example, a pheasant, say freshly skinned, should have a similar body-wire to that employed for the squirrel, but proportionately stouter to sustain the extra weight. The leg-wires should be half as stout again as the body-wire, and inserted at the back of the *tarsus* where the tendon runs. The fleshy part of the thigh must be made up in the same manner as directed in the case of the squirrel, while the body and neck are to be formed on the body-wire (see Fig. A) in precisely the same way. In the illustration Fig. A is the body-wire; B is the same dressed neatly with wood-wool bound with thread to the size of the bird's body; similar wire

must be properly dressed for a long-necked bird. With most birds the neck is almost hidden by the feathers ; but some species (like the heron) have necks requiring special treatment. With the last-named the substance is formed on the wire ; but with the first-mentioned little stuffing is needed, and that can be loosely inserted before the wire, which may be pushed through it. One end of this body-wire is thrust up the neck and



MOUNTING A KINGFISHER.

right through the skull, so that it appears through the top ; while the opposite end is made to protrude from the other extremity to support the tail. The leg-wires must be inserted through the sole of the foot and under the skin up the back of the leg where the tendon was, until the pointed wire is worked between the thumb and forefinger to equal position with the thigh-bone ; push this bone with the wire through, bind both with the requisite wood-wool, and draw them back into the skin of the thigh, then continue

working the wire on, until it has progressed far enough to pierce right through the wood-wool on the body-wire. The leg-wires must cross, and where they cross in the body they must be firmly twisted together with the pliers, so that the junction is covered by the wood-wool. Much depends on the firmness of this fastening. Next insert such wool as may seem necessary to fill out the breast, and sew up the skin neatly. Dress the feathers smooth and bend your bird into shape,



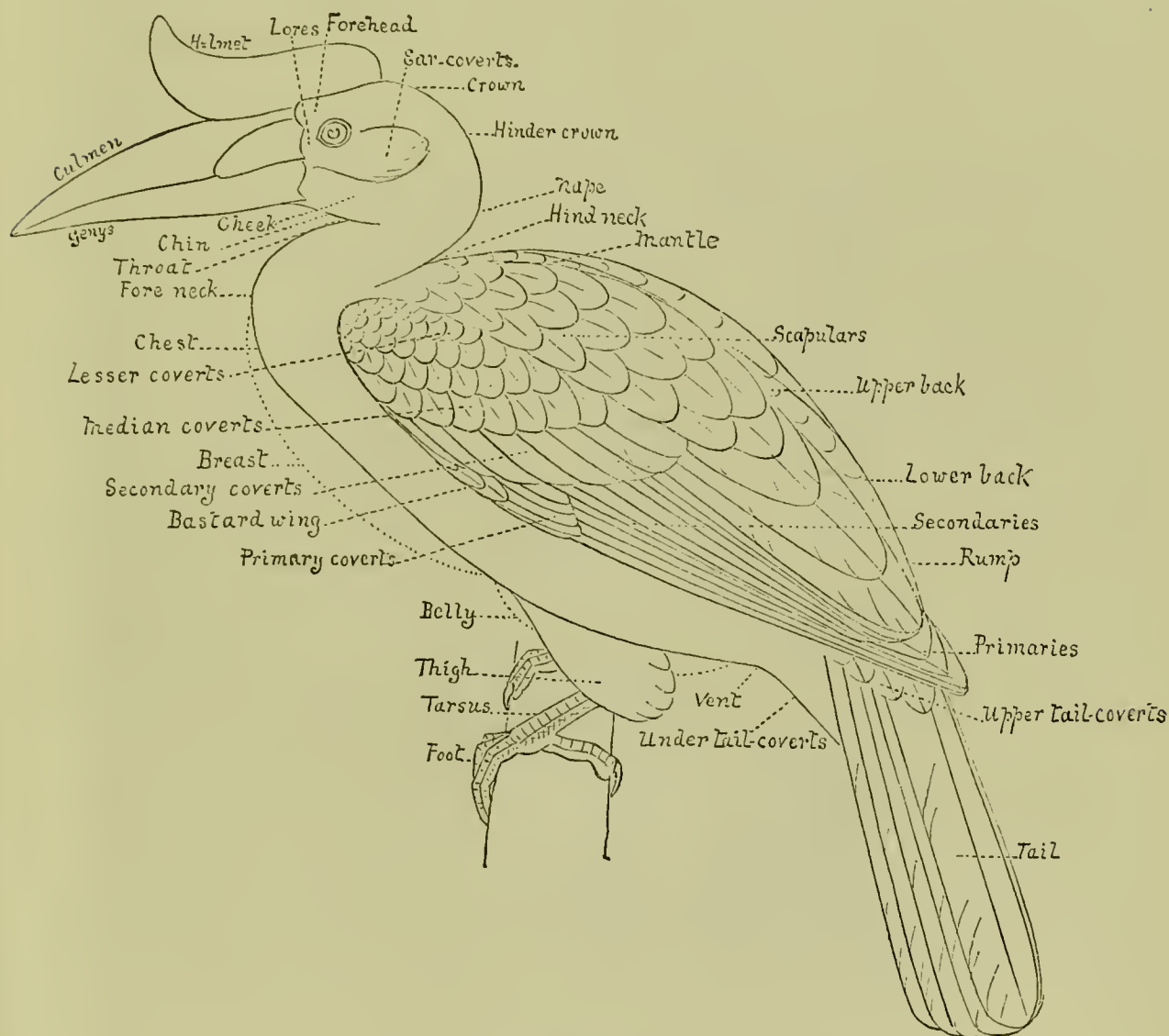
A FALCON IN THE MOUNTING

next wire him on to his perch, or other stand, whereby you gain use of both hands. Place a short wire through the quills of the tail to spread the feathers. Set the wings into position with wires, and insert a pin-wire into the back, and another into the breast; then, by means of these, lightly bind the specimen with cotton so that the feathers may dry in proper position.

You can also bind the bird in white tissue paper, as in the above illustration, instead of using cotton. Wet some of the tissue and bind it round the bird, which will keep the feathers in their correct position; it should remain on until the specimen is perfectly dry.

The symmetry and natural pose of the specimen should be a matter of most careful study; and no amount of technical skill, or of imaginative power, will in the least compensate for the want of knowledge

of nature. To have seen the bird alive in its natural habitat, and to be able to reproduce its natural appearance, is an inestimable advantage. We cannot all command that ; but we may rely on the information com-



THE ARRANGEMENTS AND NAMES OF THE FEATHERS
OF A HORNBILL.

municated by others who have enjoyed such opportunities. My father, when travelling with Audubon, accumulated an extreme valuable store of such information of this kind ; for it was the invariable practice of that great naturalist directly a specimen

was secured, and before any treatment, to have a sketch made of it in the carefully observed natural position of life, with record of all colours and contiguous, or surrounding, natural features.

The annexed illustration shows a drawing of a grouse, done before skinning the bird, which partly



SKETCHES OF A GROUSE BEFORE SKINNING,
AS A GUIDE IN MOUNTING.

shows the position of the neck in relation to the head and the crop, so that in mounting the specimen you have something from nature on which to work. This will be found specially valuable to amateurs. I have often taken a cast or photo of an animal or bird, before skinning; this procedure being specially valuable in the case of dogs.

Nothing is worse than to give a false or unnatural character to a specimen, or to mount it with details that are out of place—such as to put ferns and grasses with birds which never live where these grow, or to put sea-weeds with creatures which do not frequent the ocean or sea-shore. The true sportsman-naturalist should esteem the record of an animal's pose or habits in life as important as any other record, so that when the specimen comes into the hands of the taxidermist, the natural character of the mounting may be a feature that enhances its interest in every way. The line of form in many animals is not given by the skin, but by the fur, or feathers, as the case may be, and the character of a specimen is often destroyed by too much smoothing. By the eye and erection of the fur, the expression of anger is given. Some birds have the power of erecting their feathers, their crests, or altering the position of their plumage in token of passion, or for purposes of cleaning their plumes, as when a pelican emerges from the water ; and all character is destroyed by the misapplication of neatness, by too much tying-down of feathers, or purposeless stroking of the fur. A test of proper treatment is the setting-up of the neck. Too frequently the neck is quite distorted by the stuffing, and elongated out of all proportion in the finishing. The carriage of the head in nature is of paramount importance. When a bird is dead, the muscles of the neck become flaccid, so that the neck seems to be longer ; and this tendency is often aggravated by unskilful treatment of the skin, when serious disproportion may result. For instance, a duck sitting on the water shows but little length of neck ; sometimes, when at rest, hardly any ; but the same bird in flight shows a long neck. Some knowledge of drawing and of modelling

seems to me essential to artistic setting-up of animals ; and the best of specimens, inartistically mounted, are relatively worthless.

All the wire used for these operations should be annealed iron wire.

Should any of the feathers become displaced, they can be fixed by means of a paste made as follows : gum arabic 4 ozs., white sugar 1 oz., carbolic acid $\frac{1}{2}$ oz., starch 4 ozs., and water 10 ozs.

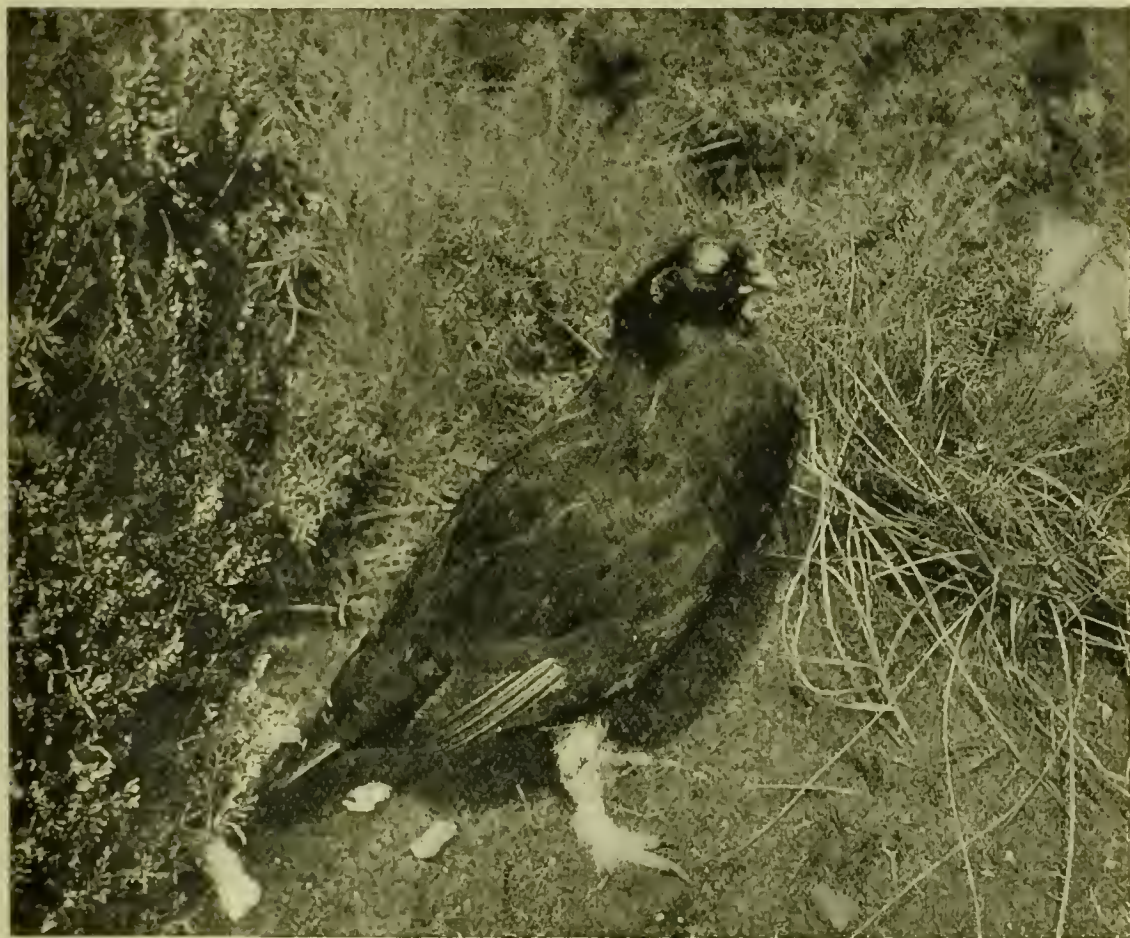


GLASS EYES FOR BIRDS.

Here it may be noted that amateurs are apt, in seeking models as to pose, action, etc., to choose thoughtlessly ; and they may be counselled never to copy any ordinary "bird-stuffer's" works, and to be very careful how they accept as authorities pictorial representations in books. If they cannot go to nature direct, in these days of instantaneous photography they can obtain photographic pictures from nature. Instantaneous photographs should be obtained, if possible,

of the specimens in life ; and these may frequently be found in illustrated magazines.

The photo below of a red grouse exhibits a method of mounting not generally used, the bird having a full crop ; it shows the bird with its eyes closed, resting after a feed.



A GROUSE MOUNTED, WITH FULL CROP.

The dried skins of foreign birds must be softened and thoroughly relaxed before being manipulated for setting-up. This is best effected by placing the specimen in a closed box, on wetted white sand, covered by paper, so that the evaporation may penetrate. The duration of this process must be determined by the size of the bird ; one night is sufficient for small

skins. The necessary stretching of the shoulders and other folded parts must be effected carefully, so as to assimilate the specimen to a fresh skin.

Birds can also be relaxed with carbolic. Put a teaspoonful in a quart of water, and after damping the skin with this solution, place it in a damping box. Instead of wet sand in the box, damp rags may be used.

The grouping and "fitting-up," as the ornamentation is technically called, of specimens are important points, careful attention to which greatly enhances their value even in a museum, where such methods are not ordinarily employed. Such addition to the naturalness of the subject often affords opportunity of illustrating by little things the habits and habitat of the animals. To take a pheasant, for example. Having set up the specimen, if it is intended to cover it by a glass case, a few natural ferns suitable to the habitat of the bird should be dried, and the faded colour restored, where necessary, by tinting with oil-pigment. Grasses should be treated in the same way. The surface of the structure on which the bird is mounted—or, in other words, the ground—should be formed of calico, tacked tastefully over a wooden framework to assume the required form.

As examples of the modern processes of bird-mounting, I cannot do better than refer the reader to the illustrations in a book which has been published by my firm; such illustrations having been from specimens mounted in my studios. It is called *The Sportsman's British Bird Book*, and is written by Mr. Lydekker. Anyone wishing to mount birds may glean a large amount of valuable information from these photographs of specimens mounted by us. The wood-pigeon shown on p. 129 is a mounted specimen, which has been

arranged in a bank and thus photographed. Although I say it myself, the photograph does not appear to be that of a stuffed bird at all.

It is essential that the plumage of birds should be quite clean and as perfect as possible before the speci-



A WOOD PIGEON MOUNTED.

men is mounted. The best way of removing blood-stains or other impurities from feathers is as follows: Dissolve a piece of pure pipeclay, about the size of a walnut, in a short pint of warm water with borax, then with a portion of fine flannel steeped in this liquid, and soaped thoroughly with best yellow soap, saturate

and rub the feather the right way ; having done this sufficiently, immerse the feather, or the bird-skin, in clear cold water till it is cleansed, then roll it in a dry cloth, which, when duly pressed, will absorb the water. Having done this, hold the specimen within the heat of a fire, all the while beating it briskly and lightly with the folded end of a clean towel. In the case of detached feathers, they may be waved rapidly,



HEAD OF A STARLING WITH FEATHERS RAISED.

or swung round at the end of a string, before the fire. Under this process plumage will resume its proper condition ; and this is perhaps the most effective, as well as the simplest, operation of the kind, surpassing the employment of spirit and plaster-of-Paris, salts-of-sorrel, blue-water, etc. Benzoline, petrol, or motor spirit, especially the first, are very valuable for the purpose. Wipe down the specimen with saturated cotton-wool, away from any light or fire, as benzoline is very volatile and quickly ignites. Fine dry plaster-

of-Paris may be used for white birds, which must be dusted and beaten till all stains are removed. For some specimens the finest boxwood or mahogany sawdust may be used; but birds with downy feathers should not be treated with sawdust. When using spirits, such as benzoline or turpentine, the specimen will look drenched to start with, but if carefully proceeded with can be made to look as well as one carefully attended to when killed.

The photograph on p. 130 shows the effect gained by rubbing Venice turpentine on the inside of a starling's headskin, so as to make the feathers stand out erect from the skin.

CASTING FISH.—Mention may be made here of a method of treating fish which is frequently more convenient, in certain circumstances, than skinning, and at the same time sufficiently efficacious for the purpose. This is to cast the specimen in plaster-of-Paris; and, whether it is decided to complete the cast with imitative colouring, or simply to preserve it in white, accuracy of form is at least obtained. A mould must be made. Most fish are more or less covered with a transparent slime, which, for purposes of casting, would obscure the finer external features, such as scales, etc. This coating must be removed. To effect this, lightly sponge the specimen with diluted vitriol, which will have the effect of changing the slime into an opaque film, which can be removed almost like a skin. The fish must then be carefully posed in position, on its side, and all those portions underneath where the plaster would penetrate filled in with clay; this, indeed, should form a bed for the fish, whose fins should be displayed by being impressed into the surface by means of the thumb. The plaster must

be carefully prepared:—put some water in a vessel and lightly shake the plaster, with the fingers, into it—not pour the water on to the plaster. The first batch should be very thin, only a little thicker than milk; it thickens rapidly as it stands. Pour this thin plaster over the specimen—skilfully, so that each portion is well covered, and all the interstices filled with a first film of white. Directly this is set, put on a second coating of thicker plaster, and so on till the mould is thick enough; shape it at last roughly with the fingers. When dry, or rather quite hard, turn the mould over, pick out the clay, take out the fish, and the mould will be fit for use. In many cases half an inch will be a sufficient thickness for the plaster. This is what is called a “waste-mould,” and the reason will be readily seen. The cast is produced by substituting plaster in place of the fish, thus: First dip the mould, if space admit of it, into cold water, so that the inner surface becomes thoroughly saturated; or, if the mould be too large to immerse it, wash the inside lightly over with sufficient clay-water, that is, water coloured with modelling clay; the object being by saturation to prevent all absorption on the inner surfaces. If the mould has been preserved till it is dry, an application of boiled oil will have the same effect. The plaster to be inserted must be skilfully mixed, at first quite thin, and washed into the mould so as to fill all interstices, without any bladders or bubbles appearing as this first coating sets. A second coating strengthens the first, and so on; but there is no occasion to make the object solid, although the walls of the cast must in all places be of sufficient thickness. When the plaster is well set hard, the next process is to chip away the mould from the cast, and

the mould is therefore called "waste." This requires skill in the application of sufficient, but not too much strength. It is a convenient practice to put a little tint into the plaster of the mould so that it may be clearly distinguishable from the cast when we come to chip it away. The cast when cleared should present all details of the specimen perfectly. If the model is wanted only as a copy, it may be taken from the mould in clay; but such a model is not permanent. When a number of copies of the cast are required, it is necessary to make a "piece-mould"—a much more complex operation. It is a mould that is made on the object, in pieces that fit perfectly together, and can be removed one by one from the cast, and replaced in position for each cast. It is necessary to make such a mould on a cast, because the yielding nature of the fish would bring about a distortion of parts in a piece-mould; therefore a waste-mould must be employed in the first operation. The piece-mould exercises the skill of the operator and his judgment. No explanation of the process could teach it so readily as the examination of the thing itself, and an old piece-mould can sometimes be obtained in London which will serve as a guide.

Plaster moulds of the above type may also be employed for making casts of dolphins and porpoises, the skins of which, owing to the amount of contained oil, are very unsatisfactory for mounting. Such casts, coloured to nature, are now being installed in the Natural History Museum, to replace the old mounted skins.

WAX MOULDS are useful for some specimens, and can be made quite easily. Any wax will do for the purpose, such as that of candles, which after the first

cost is inexpensive to work, because it can be used over and over again. Hot wax should be poured over the specimen, and when set the object removed, and the mould filled with plaster. After the plaster has set, warm the wax and save in a vessel ready for use again. Some make a jelly-mould, but without professional assistance this is difficult.

SKIN-DRESSING.—It is a standing difficulty with many sportsmen how best to prepare the skins of animals, so as to make of them the supple and beautiful leather that leaves the hands of the professional furrier, and thus to make the skins available for wearing apparel, rugs, etc., worked according to taste. The right way to proceed is the following :—Let us suppose the subject to be the dried skin of an Indian leopard. The skin must first be sponged on the flesh-side with “ liquor ” till it is softened, and then properly “ shaved.” It should then be partially dried. When in this condition the skin should be folded with the hair inwards, and the edges fastened together with stitches at intervals of about 12 inches. The object of this is that the operator may subject the flesh-side to the action of grease. For a leopard about 3 lbs. of lard will be required : this is the proper dressing, butter turning rancid in the skin, and being therefore unsuitable for the purpose. The usual mode is to put the skin into a clean tub with the grease, and to tread or knead it with the bare feet, till the action and the natural heat have caused the fat sufficiently and equally to penetrate the fibre of the pelt. The skin may then be laid open and “ shaved ” a little thinner on the flesh-side. The next operation is to clean the fur. To do this, place the skin on a bench with the hair uppermost, and cover it well with fine mahogany-dust

procured from a veneer-mill. Rub this powder with the hand well into the fur, so that it absorbs all the grease, and at the same time cleanses the coat; and after the skin has been sharply beaten with light canes until the dust has all been removed, the natural brilliancy of the specimen will be restored. A process perhaps more convenient to many persons, but not so effectual, is to rub in the grease with the hand.

As the cost of skin-dressing in professional hands seldom exceeds many shillings, this branch of taxidermy is but little practised by amateurs.

SOME PRESS OPINIONS

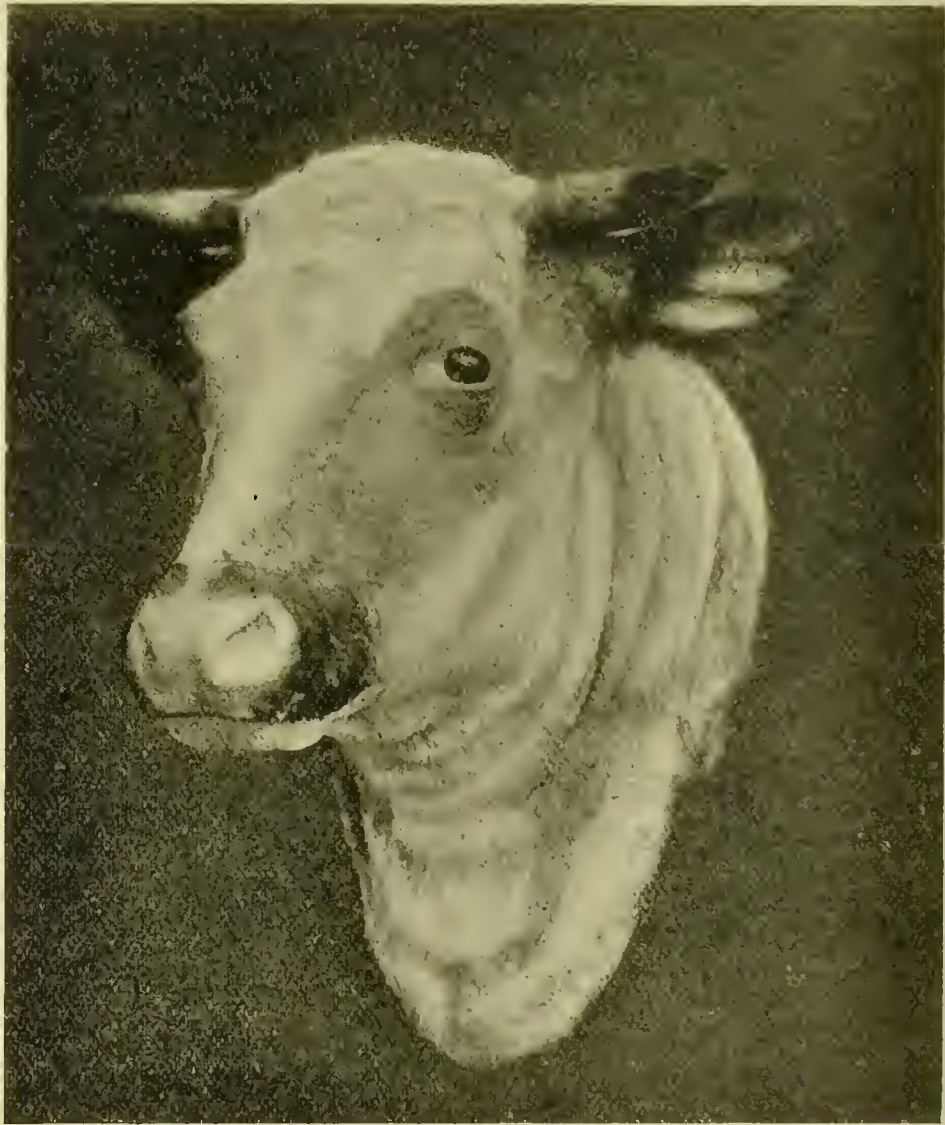
At the conclusion of this section of the volume I may perhaps be permitted to quote a few extracts from the press relating to my work.

“The Combat of Red Deer” exhibited in the “Scientific Inventions and New Discoveries” Exhibition, and at the Crystal Palace, 1871:—

“Mr. Rowland Ward has lately completed a group of red deer fighting, with a fury common to this animal. . . . Mr. Ward has prepared his two deer, engaged in deadly strife, to test a paste or cement, which, from its ductility and adhesiveness, he believes to be an important improvement upon compositions previously in use. How far he has succeeded in this, as well as in imparting the fury and passion of life to his group, the public will have an opportunity of judging, as ‘The Combat of Two Deer’ has been prepared expressly for the International Exhibition. To our thinking the fierce animals seem to fight with deadly spirit. Tendon and muscle are strained to the utmost in the deadly struggle. We compliment Mr. Ward upon his early appreciation of the essential features of his interesting profession. But this may be explained by the fact that he is a son of a well-known naturalist, and that he may be said to have been born and bred to the profession. He is indeed one of

a third generation of naturalists.”—*Standard*, February 3rd, 1871.

“Mr. Ward . . . is the originator of a perfectly new medium which secures the facial expression and muscular appearance of wild and other animals. The value of this



HEAD OF THE HEIFER “LADY FLORA.”

Modelled by Rowland Ward, 1873.

process is remarkably shown in a colossal group of stags, entitled ‘The Combat,’ which is intended for show at the forthcoming International Exhibition. We see mounted in a most tasteful manner and natural foreground two stags, the one having gored the other in a mortal part. The fierceness of this fight *à l’outrance* is wonderfully rendered,

the eyes and tongue of the victor being displayed with marvellous fidelity, and with an utter absence of that dull, listless unreality so generally characteristic of stuffed beasts. The firmness by which the muscles are made to seem elevated or depressed is quite peculiar to the new method here brought to perfection. Nothing could represent in-



THE MCCARTE LION.
Modelled by Rowland Ward, 1874.

tensity of agony better than the upturned gaze of the unfortunate animal stricken unto death in this fine group. It is a mastery of art.”—*Bell's Life*, February 25th, 1871.

“We are certain it will bring high fame to the meritorious and modest young artist, who has achieved so excellent a work of art.”—*Land and Water*, February 25th, 1871.

I next turn to the head of the heifer Lady "Flora," an animal which was awarded the championship in her class at the Smithfield Club Show of 1873. This trophy, which received several commendatory notices, was mounted by the same method as the last. As



FRONT VIEW OF HEAD OF THE MCCARTE LION

already mentioned, when examined in January, 1911, it was found to be in an excellent state of preservation, although during these thirty-seven years it had not been kept under glass.

I next refer to the McCarte Lion modelled by myself in the year 1874. It represents a lion that has

been wounded behind the shoulder, in a sitting position, howling with rage, and on the look-out for his enemy.

“We have on former occasions done justice to the scientific and artistic truth of Mr. Ward’s reproductions of animal forms by a correct anatomical use of their outer natural covering, which is not stuffed, but placed on a cast moulded to show the muscles in action. The lion in this instance appears in quite a dramatic attitude and character. . . .”—*Illustrated London News*, November 28th, 1874.

“It is a triumph of modelling. All the artistic powers of a Landseer.”—*Figaro*.

“Hailed as a real triumph of taxidermal art.”—*Morning Post*.

Lastly, I take the group entitled “A Trying Moment,” modelled by myself in 1875, and representing an elephant and a tigress in mortal combat:—

“Mr. Rowland Ward has already distinguished himself by introducing a great improvement in the art of taxidermy, consisting in actually modelling every muscle in a plastic substance, over which the skin of the animal is to be finally placed. His previous high reputation will not suffer by his present work, *A Trying Moment*. As a rule, taxidermists depend upon the skin of an animal to preserve the shape and proportions, too frequently failing, through the shrinking of the skin in course of time, and the general unsuitableness of the material used in stuffing. By Mr. Rowland Ward’s system the muscular action is not only displayed, but the whole conformation lasts as long as the substances themselves. The plastic substance hardens, and is virtually imperishable. Its fidelity to nature is remarkable. . . . The tigress has all four feet at work, supporting herself by one foot on one of the tusks, and vigorously clawing with the other three into the quivering flesh. The raised trunk, the evident ‘bellowing’ or ‘trumpeting’ of the poor elephant, tell of the fright and agony it is enduring; nevertheless the experience of those who have witnessed such encounters goes to prove that the pachyderm

is almost invariably the conqueror by simply managing to get the tiger under and crushing it with its immense weight. The whole effect is heightened by a new and artistic mode in forming the artificial eyes, which Mr. Ward invented, and has used for some time with great success."—*Illustrated Sporting and Dramatic News*, May 27th, 1876.



A TRYING MOMENT.

Modelled by Rowland Ward, 1875.

HUNTING FIELDS OF THE WORLD

THE present sketch relates to the chief hunting fields of the world in which big game is to be sought, and where interesting animals may be obtained at the same time that sport of the best description may be enjoyed. Within the space available it is impossible to give lists of all the interesting animals inhabiting the various districts, and it must accordingly suffice to direct attention to some of the more important of them. While attention is chiefly concentrated on animals of sport, and especially big game, mammals or birds remarkable for their rarity, their peculiar structure, or their beauty and brilliancy of colour have also received special mention. The sketch would undoubtedly have been more useful to the sportsman had it been possible to refer to some of the leading features of the species mentioned, but this is rendered impracticable by the limits of space. Accordingly, for such details the sportsman or collector must refer to other and larger works.¹

While treating of all the chief hunting grounds of the world, it has been found advisable to avoid mentioning for the most part special districts or spots where good sport may be expected; firstly, because a locality which in one particular season abounds in

¹ *The Game Animals of Africa* and *The Game Animals of India*, etc., by R. Lydekker; *American Animals*, by Stone and Cram. London: Rowland Ward, Ltd.

game may soon after become less productive ; and, secondly, because what one sportsman describes as a good hunting ground may not be regarded in the same light by his successor.

The plan adopted in the present sketch is to take a general survey of the big game and other specially interesting animals of European countries, and then to pass on in a similar manner to Asia, whence the transition is easy to Australasia. Africa is then taken in sections, with a brief reference to Madagascar ; while the sketch concludes with a similar survey of the New World, commencing with North and concluding with South America. The author is aware that this treatment does not accord with the geographical distribution of animals, but it is the one which seems best suited to the subject.

MOUNTAINS OF SOUTH, CENTRAL, AND EAST EUROPE. —Since mountain ranges are the chief haunts of large game in Europe at the present day, attention may first of all be directed to the great chains of the Pyrenees, the Alps, the Apennines, the Carpathians, and the Caucasus. Different in many respects as are their faunas, these ranges have one feature in common, namely, that they are all inhabited by the chamois (*Rupicapra tragus*), which is unknown in other parts of the world, with the exception of Asia Minor. The chamois of each of these mountain ranges appears, however, to form a distinct local race by itself ; the Pyrenean animal being locally known on the French side as the izard, and on the Spanish flank of the range as rebeco. The distinctive big-game animal of the Pyrenees and other Spanish ranges is, however, the handsome Pyrenean ibex (*Capra pyrenaica*), which in some degree serves to connect the Caucasian tur

with the Himalayan markhor. The other large animals of Spain and Portugal include local races of the red deer (*Cervus elaphus*) and the roebuck (*Capreolus caprea*), the wild boar (*Sus scrofa*), the brown bear (*Ursus arctus*), the Spanish lynx (*Felis pardina*), the wolf (*Canis lupus*), and the fox (*C. vulpes*). The genet (*Genetta vulgaris*) and the mongoose (*Herpestes ichneumon*) also occur in Spain. Fallow deer (*Cervus dama*) occur in several parts of the country, although nowhere apparently in a truly wild condition. Among small mammals, special interest attaches to the Pyrenean desman (*Myogale pyrenaica*), a long-snouted aquatic species related to the mole, and represented by a larger species (*M. moschata*) in the rivers of Russia. The birds of Spain are very numerous and well calculated to attract the attention of the sportsman. Ptarmigan extend as far east as the Pyrenees. The great bustard (*Otis tarda*) is met with on the open lands of the interior, whence its range extends as far eastward, in suitable localities, as Mesopotamia. The little bustard (*Otis tetrax*), the capercaillie (*Tetrao urogallus*), and several other game-birds are likewise found; but the most famous bird-resorts in Spain are the extensive mud-flats of the Guadalquivir, where waders of many kinds collect, especially during winter, in immense flocks. Among these are spoonbills, purple heron, night-herons, and egrets, together with various kinds of geese and ducks. Snipe are abundant in winter on and around the numerous *lagunas* or shallow lakes; but most attractive of all are the flocks of graceful flamingoes (*Phænicopterus roseus*) which nest on the open flats of the Guadalquivir, while pelicans (*Pelecanus onocrotalus*) resort to the reedy swamps. The grandest of European birds-of-prey, the lammergeier (*Gypaëtus*

barbatus), which has been completely exterminated from the Swiss Alps, still sails in lordly flight over the upland valleys of the Iberian Peninsula. Eagles, falcons, owls, and other birds-of-prey, as well as numerous species of other groups rarely or never met with in the British Islands, are likewise abundant.

Passing eastwards to the Alps of Switzerland and Italy, these mountains have a special interest to the sportsman as forming the sole habitat of the true or Alpine ibex (*Capra ibex*), the steinbok of the German and the bouquetin of the French Cantons. Long since exterminated from the Swiss side, a few herds still survive under government protection in certain valleys on the Italian side of Monte Rosa. To shoot ibex a special permit is, however, essential. The chamois, or gems, is still fairly abundant in many parts of the Alps, notably the Engadine; but the natives of the latter district have a prejudice against strangers shooting within their borders, so that it is preferable to cross to the Italian side, which may easily be reached from Pontresina.

Italy itself does not appear to be much favoured as a hunting-ground by British sportsmen, probably owing to the fact that big game is scarce, and that in many districts the climate at certain seasons of the year is unhealthy. Excellent wild-fowl shooting is, however, to be obtained during winter in the marshes, in which snipe also abound. On the other hand, Corsica and Sardinia are celebrated as the home of the European wild sheep or mouflon (*Ovis musimon*); and, in common with other Mediterranean countries, they possess the additional advantage of easy access by sea, so that the sport they offer may be enjoyed during a yachting-cruise. September and October are the best months; Sardinia

being the favoured island for mouflon-shooting. Both islands are likewise inhabited by a small race of red deer (*Cervus elaphus corsicanus*) akin to the rather larger race of North Africa; and they also afford wild boar shooting. Several kinds of game-birds inhabit these islands, the Barbary partridge (*Caccabis petrosa*) occurring in Sardinia, while in Elba, Corsica, and the Balearic Islands, as well as in north and central Italy, it is replaced by the red-legged partridge (*C. rufa*). Formerly the francolin (*Francolinus vulgaris*) inhabited Sicily, where, however, it is now apparently extinct, although still abundant in Cyprus and Asia Minor. The hoopoe (*Upupa*), roller (*Coracias*), bee-eater (*Merops*), and golden oriole (*Oriolus*) are among the more conspicuous bright-coloured birds of these countries.

Crossing to the eastern side of the Adriatic and the Ionian Sea, shooting of various descriptions may be obtained both on the mainland and on certain of the numerous islands, although there is the disadvantage that in some districts the natives are not always so civil as they might be, while there may also be danger from brigands. In the Ionian Islands the chukor partridge (*Caccabis chucar*), which probably also occurs on the Grecian mainland, is first met with. Wild goats occur in the mountains of the island of Joura, near Eubœa, but some at least of these are the descendants of domesticated breeds. On the other hand, in Crete the pasang, or wild goat, is represented by a small race (*Capra hircus cretica*), also reported from the island of Tavolara, off the north-east of Sardinia.

On the mainland Albania is celebrated for the number and size of its wild boars, as it also is for its autumnal and winter flights of woodcock. The island of Corfu is also renowned for its woodcock-shooting.

Permission to shoot in Albania was formerly granted by the Turkish Consulate at Corfu, but the British sportsman should obtain permits through the Embassy at Constantinople.

Throughout the Balkans and the mountainous forest districts of Turkey the splendid maral or eastern race of the red deer (*Cervus elaphus maral*), or a closely related form, is abundant; these Turkish red deer frequently having very few tines to the antlers.

From the neighbourhood of the Balkans the passage is easy to Transylvania, the Carpathians, and the Tyrol, where red deer of apparently more than one type are to be met with, although their relationship to the maral is not yet fully worked out. The roebuck attains large dimensions in these districts, where the chamois are characterised by their dark colour. Wild boar and, locally, brown bears are to be met with.

Travelling eastwards to the Caucasus,¹ the sportsman enters a district containing the finest fauna of large game extant in Europe, and one in which for the first time the sportsman encounters animals of an Oriental type, mingled with others belonging to eastern Europe, and a few peculiar to this particular area.

The big game of this range include the aforesaid eastern red deer (*Cervus elaphus maral*), locally known as the ollen, the Russian term for all deer; and likewise the roebuck (*Capreolus*). In the southern extremity occurs the pasang, or wild goat (*Capra hircus agagrus*), while in other parts are found two altogether peculiar types of goat, namely, Pallas's tur (*C. cylindricornis*)

¹ See *Hunting Trips in the Caucasus*, by E. Demidoff (Prince San Donato). London: Rowland Ward, Ltd.

and the more ibex-like western tur (*C. caucasica*), of which there appear to be three local races. On the domain of the late Prince Paul Demidoff Pallas's tur grows enormous horns. The noblest of all the Caucasian hoofed animals is undoubtedly the bison, miscalled aurochs (*Bos bonasus causicus*), which is found in a truly wild and unprotected condition, and represents a race distinct from the typical Lithuanian bison. As already mentioned, the chamois (*Rupicapra tragus*) is likewise an inhabitant of these mountains. Of Carnivora, the wolf (*Canis lupus*) and the brown bear (*Ursus arctus*) appear to be the most common; the latter species being in some cases of the ordinary brown colour, and in others of a beautiful silver-grey. On the northern flanks of the range specimens of the Persian race of the tiger (*Felis tigris septentrionalis*) are occasionally seen, while a pale-coloured race of the leopard (*F. pardus tulliana*) is by no means uncommon among the higher crags, and the lynx (*F. lynx*) is to be met with in the forests. The jackal (*Canis aureus*), which ranges as far west as Dalmatia and Greece, is also met with; while the common fox (*C. vulpes*) and the corsac (*C. corsac*) likewise occur, as does also the badger (*Meles taxus*). Hares are represented by a local race of the brown species (*Lepus europæus caspius*).

Among game-birds mention may be made of the Caucasian blackcock (*Tetrao mlokosiewiczi*), the capercaillie (*T. urogallus*), the Caucasian snow-cock or snow-partridge (*Tetraogallus causicus*), and the Caspian snow-cock (*T. caspius*). The partridge (*Perdix cinerea*) inhabits lower levels, as do red-legged partridges.

RUSSIA.—Of Russia north of the Caucasus a brief

notice will suffice; firstly, for the reason that the country is by no means easy of access to British sportsmen, and, secondly, because the fauna of its western districts approximates to that of the Scandinavian peninsula, while that of the eastern provinces is more or less of a Central Asian type. The great prize in Russian shooting is, of course, the bison, or zubr (*Bos bonasus*) of the forest of Bielowitza, in the government of Grodno, the ancient Lithuania. The bison in this tract are strictly preserved, and are indeed in a state bordering on domestication, and permission to shoot them is but rarely granted to British sportsmen. Although specifically the same as the Caucasian race, the Bielowitza bison (or aurochs,¹ as it is generally mis-called) presents certain differences from the former, which are now deemed worthy of racial distinction. In the Kazan district, on the south-western flanks of the Urals, the reindeer (*Rangifer tarandus*) extends as far south as latitude 54° N., and on the opposite side of that range, in the Kirghiz steppes of Asiatic Russia, two degrees still farther southward. In suitable localities the elk (*Alces machlis*) is found to the northward of the fiftieth parallel, its range extending eastwards right across Asia to Amurland. Red deer (*Cervus elaphus*) are also widely spread over Russia, as is the roebuck (*Capreolus caprea*), represented on the eastern side of the Urals by the larger and paler-coloured Siberian *C. pygargus*. In the trans-Volga districts of south-east European Russia occurs that remarkable antelope the saiga (*Saiga tatarica*), whose headquarters are, however, the Kirghiz steppes of Asiatic Russia. The brown bear and the wolf are common in Russia, where the lynx, foxes of several species, otter, sable,

¹ This name belongs to the extinct European wild ox.

and other fur-bearing mammals also occur. There are likewise several species of eagles and other raptorial birds not met with in western Europe, while the Urals are the habitat of a race of the capercaillie (*Tetrao urogallus uralensis*). Sand-grouse are found on the plains of the Volga district, and still more abundantly on the Kirghiz steppes of Asiatic Russia. Ptarmigan (*Lagopus mutus*) range as far east as the Urals. Hazel-hens (*Tetrastes bonasia*) abound in the forests of Volhynia, but in Perm this species is replaced by the grey-bellied *T. griseiventris*.

SCANDINAVIA AND LAPLAND.—The fauna of Lapland forms a connecting link between that of central Russia and that of Scandinavia. In Denmark the larger Carnivora have been exterminated, and it is not till we enter Norway and Sweden that such animals as bears are encountered. Both the latter countries are favourite resorts of the sportsman, not only on account of the numerous kinds of large and small game to be obtained there, but also from their easy accessibility from Britain, the healthiness of the climate, certain facilities of transit, and the beauty and varied character of the scenery. The backbone of mountains running along its western side, the numerous fjords on the same coast, and the vast forests covering a large portion of the interior coast-line, render the peninsula a safe retreat for large mammals, as well as for raptorial and game birds and hosts of water-fowl. The whole country, and especially Lapland, is, indeed, the breeding-ground for vast numbers of birds which journey northwards in spring from their winter resorts in warmer parts of Europe.

Here it may be noted that on private estates in the peninsula the sportsman has only to get the per-

mission of the owner to shoot (for which, however, payment is usually demanded), no license being requisite. On the other hand, for permission to shoot or fish on Crown lands a license must be obtained. Both in the rivers and in the fjords the fishing is excellent; and so good is the salmon-fishing that many of the best rivers are leased to English sportsmen. Since the ground in most districts is covered with snow for seven months in the year, the sporting season is chiefly in the summer and autumn. In past times the whole of the country was overrun with beasts-of-prey, but these have been to a great extent driven back to the forests and mountains of the northern provinces, where they are still comparatively abundant. The yearly visits of sportsmen must, however, ultimately tell on the numbers of the game, and already certain localities are more or less shot out. Where bears and wolves are sufficiently numerous to inflict serious damage on flocks and herds, the peasants periodically organise large hunts or drives, and likewise resort to trapping and snaring.

The largest, and in some respects the most formidable, of the Scandinavian Carnivora, the brown bear (*Ursus arctus*), is now seldom found except in Dalecarlia and the northern provinces. Many individuals attain great size and bulk, some weighing as much as four or even five hundredweight; and it is believed that they continue to grow till about their twentieth year. Wolves, badgers, and foxes are to be met with everywhere. Of more northern types, the glutton, or wolverine (*Gulo luscus*), whose skin has considerable commercial value, is now and then killed in the forests of Dalecarlia, and is more common in those of Finmark and Lapland. In these northern

districts the sportsman may likewise meet with the Arctic fox (*Canis lagopus*), either of the blue or the white phase. Other Scandinavian Carnivora are the lynx (*Felis lynx*), the otter (*Lutra vulgaris*), the pine-marten (*Mustela martes*), and smaller species of the same group, such as the polecat, the stoat or ermine, and the weasel. Certain parts of Norway are among the last resorts of the beaver (*Castor fiber*), but these rodents are now protected by special laws. The Scandinavian hare is the blue *Lepus timidus*, replaced in the north by a local race (*L. t. collinus*).

In possessing all the five species of deer indigenous to Europe, the Scandinavian peninsula occupies a unique position. One of these, however, the fallow deer (*Cervus dama*), is not known to occur in the wild state. The other four are the red deer (*C. elaphus*), of which this region possesses the typical form, the roebuck (*Capreolus caprea*), the elk (*Alces machlis*), and the reindeer (*Rangifer tarandus*). Of these, the elk, which is the largest existing member of the *Cervidæ*, has completely disappeared from the province of Scania, where it was once abundant; but in some other districts, where it is protected, its numbers have decidedly increased. The reindeer of Finland has been separated as a distinct race (*R. t. fennicus*). The shooting-season for elk extends from the 1st to the 31st of September or the 15th of October; each district has, however, its own regulations, and in certain cases it seems that the time may be extended to 31st October. Full details are annually given in the local almanacs; and from these it will be seen that in some districts elk-hunting with dogs is forbidden for one or more years. By the natives elk are hunted in two fashions, an elk-hound in leash being employed in

Norway, while in Sweden a lighter breed of dog is allowed to range freely in search of its quarry. The pairing-season of elk in Norway commences about September 20th, and the stags shed their antlers the following February, and commence to grow the new ones in May, which are clear of the velvet in August or September. The antlers begin to degenerate after the twelfth year. Highland elk are stated to differ from those of the plains by the slight development of palmation in the antlers. The calves, either one or two at a birth, are born in May. Whereas elk are essentially forest-dwelling animals, reindeer in the wild condition are inhabitants of the open high fjeld of the peninsula, especially in the Dalecarlian and Koelen mountains. Although considerable herds are still to be met with in certain districts, the size of these bears no comparison to those described by sportsmen a century ago. The reindeer and its American representative the caribou are the only members of the deer tribe in which antlers are developed in both sexes.

Among birds, mention may be made of the golden eagle (*Aquila chrysaetus*) and the great horned owl (*Bubo ignavus*), which are to be found in suitable districts throughout the country, and also of the great Lapp owl (*Syrnium lapponicum*) and the beautiful snowy owl (*Nyctea scandiaca*), which are restricted to the extreme north and Lapland. On the lowlands of Sweden, where it was formerly numerous, the bustard (*Otis tarda*) still lingers. Game-birds are remarkably numerous both in species and individuals; foremost in point of size being the capercaillie (*Tetrao urogallus*), which in the south attains a weight of 16 lbs., or even more, and is met with in all the pine-woods, and more especially those of the hilly districts. Still

more abundant is the blackcock (*Tetrao tetrix*), while the hazel-hen (*Tetrastes bonasia*) inhabits the woods and hills of the more northern districts. Of the true grouse there are two representatives, namely, the willow-grouse, or dal ripa (*Lagopus albus*), chiefly inhabiting the northern forest districts and the islands, and the ptarmigan, or fjäll ripa (*L. mutus*), which frequents the high stony table-lands and rocks above the limit of tree-growth and heaths. The partridge (*Perdix cinerea*) is also an inhabitant of the peninsula, although nowhere abundant; while the quail (*Coturnix communis*) in some seasons makes its appearance in considerable numbers in Norway, but is always rare in Sweden. Woodcock (*Scolopax rusticula*), although sometimes arriving in considerable flights on the western coast during spring and autumn, are generally scarce, and are yearly becoming more so. Snipe of various kinds frequent the low grounds. Duck and other water-birds abound on the lakes, rivers, and fjords; and fine shooting may be had in almost any part of the country, although the best is apparently at Nordholm. The belt of islands, or Skärgård, is also an excellent situation for this kind of sport. Among Norwegian water-fowl the following are some of the most abundant or notable:—Swans (*Cygnus*), geese (*Anser*), wild duck (*Anas boschas*), teal (*Nettion crecca*), wigeon (*Mareca penelope*), tufted duck (*Fuligula cristata*), golden-eye (*Clangula glaucion*), long-tailed duck (*Harelda glacialis*), eider duck (*Somateria mollissima*), king eider (*S. spectabilis*), and Steller's eider (*S. stelleri*). Of the three species of eider the first is common all along the western coast, but the second is only a winter visitor to the peninsula, where it does not breed, while the third, although very rare, nests on the Varanger-

fjord. Two other members of the duck tribe, the merganser (*Mergus serrator*) and goosander (*M. merganser*), are also worthy of mention. In addition to these are the black-throated and red-throated divers (*Colymbus arcticus* and *septentrionalis*); while that splendid bird the great crested grebe (*Podiceps cristatus*), although a rare visitor to Norway, breeds in southern Sweden and Denmark, as it also does on both shores of the Baltic. Gulls and terns of various species are of course numerous on all the tidal waters.

Here it may be mentioned that a station for the capture of whales has been established near Hammerfest, and a second on the Varanger-fjord; the species most commonly taken being the humpback (*Megaptera boöps*), Rudolphi's rorqual (*Balænoptera borealis*), and the common rorqual (*B. musculus*), while examples of the blue rorqual (*B. sibbaldi*), the Atlantic black whale (*Balæna biscayensis*), and the sperm-whale (*Physeter macrocephalus*) are less commonly captured. Seals frequent the coasts in some numbers.

ARCTIC EUROPE AND ASIA.—Strictly speaking, there is only a single circumpolar province, many of the animals of Arctic America being closely allied to, or identical with, those inhabiting the extreme north of Asia and Europe, but it is more convenient in a work of the present nature to treat the two areas separately. And since northern Scandinavia and Lapland lie well within the Arctic circle, the passage from these to the countries still farther north is easy. On the ice-bound coasts of Spitzbergen, and more especially in the neighbourhood of Diana Bay and the Thousand Islands on the southern side, sport of a peculiar and exciting nature may be obtained with comparative ease, although the country is not generally

accessible before July. In addition to several species of seals, such as the grey seal (*Halichærus grypus*), crested seal (*Cystophora cristata*), and ringed seal (*Phoca barbata*), the Atlantic walrus (*Odobænus rosmarus*) is to be reckoned among the prizes of the sportsman. It is true that its tusks are not so large as those of its Pacific relative, but they form unique trophies.

The following notes on Arctic shooting have been supplied by Mr. W. Livingstone Learmonth :—" Leaving on one side the Arctic right whale, which affords, I think, the finest sport in the world, but the chase of which scarcely comes within the range of the amateur, I pass to relatively minor animals such as the polar bear and walrus. I cannot call the polar bear (*Ursus maritimus*) a sporting animal; I have only seen two show fight out of a very large number shot. Walrus, if hunted as the Eskimo hunt them—that is, with a hand-harpoon and a *drogue* (inflated seal-skin)—afford magnificent sport. When hunted with a rifle they require very accurate shooting, as if merely wounded, they only die later on. No finer field for big-game shooting than the Arctic exists. For polar bear the Spitzbergen or Franz-Josef-land seas should be chosen; while for walrus, Franz-Josef-land, or, on the American side, Baffin Bay and Lancaster Sound, offer the best possibilities."

In order to obtain the beautiful spiral tusk of the male narwhal (*Monodon monoceros*)—for this curious cetacean seldom develops more than one—special hunting arrangements must be made with the natives.

In eastern Siberia, especially in the ranges bordering the Yana and Lena, occurs Clifton's big-horn sheep (*Ovis canadensis borealis*), a near relative of the under-mentioned Kamchatkan big-horn, but with more white on the face and rump, and larger ears. The

forest region is probably the home of an elk (*Alces machlis bedfordiae*), in which the antlers have typically little or no palmation, although fully palmated antlers occur in Yakutsk and elsewhere.

Throughout the Arctic regions of the Old World reindeer occur wherever sufficient nutriment is obtainable; and Arctic foxes likewise extend to the most northern habitable land. The hare is a race of the blue species (*Lepus timidus tschukiscorum*). The birds of the Arctic regions include those mentioned above under the head of Scandinavia, together with many others; but to enumerate these would far exceed the limits of space, although it may be mentioned that the Spitzbergen ptarmigan (*Lagopus hyperboreus*) is distinct from both the Scandinavian species, being distinguishable at a glance by the greater amount of white on the base of the tail-feathers at all seasons of the year. In habits also it is different from the Norwegian species.

KAMCHATKA.¹—Although walruses are unknown eastward of the valley of the Yenisei, many of the Arctic animals of the Old World continue their range eastwards to the neighbourhood of Bering Strait. The Kamchatkan big-horn (*Ovis canadensis nivicola*), which inhabits the peninsula of Kamchatka, where these sheep are found close to the shore, is, for instance, only a local race of the typical American big-horn. The country inhabited by these sheep is comparatively easy of access to the sportsman desirous of adding their horns to his trophies. Kamchatka is also the abode of a huge race of the brown bear (*Ursus arctus piscator*) nearly allied to some of the Alaskan repre-

¹ See E. Demidoff (Prince San Donato), *A Shooting Trip to Kamchatka*. London: Rowland Ward, Ltd.

sentatives of the species. The valuable sable (*Mustela zibellina*) is also procurable in Kamchatka, as well as in Siberia; while the Kurile Islands, which connect the peninsula with Japan, are the hunting-grounds for the sea-otter (*Latax lutris*), whose skin may be worth any price between £40 and £100, or even considerably more. The local blue hare is *Lepus timidus gichiganus*. Game-birds are abundant, the largest being the Kamchatkan capercaillie (*Tetrao camchaticus*), a near relative of the Siberian *T. parvirostris*. The rivers, too, at certain seasons of the year are absolutely packed with salmon, mostly belonging to the Pacific genus *Oncorhynchus*.

MANCHURIA AND NORTHERN ASIA.—Although the Japanese islands are inhabited by a small species of deer (*Cervus sica*), a serow (*Nemorhædus crispus*), and two kinds of bear, as well as by Sömmerring's pheasant (*Phasianus scæmmerringi*) and other game-birds, they appear to be little known as hunting-grounds. Passing on to Amurland and Manchuria on the mainland, and thence into Central Asia north of Tibet and China proper, it may be noted that as a hunting-ground the great characteristic of this vast area is the number of species and races of large deer and sheep by which it is inhabited, the antlers and horns of these affording some of the most magnificent trophies the sportsman can desire.¹ Much of the country is, however, extremely difficult of access, and many parts are still more or less completely unknown to the British sportsman. Amurland and northern Manchuria, especially the neighbourhood of the Usuri

¹ See *After Wild Sheep in the Altai and Mongolia*, by E. Demidoff (Prince San Donato), and *Through the Highlands of Siberia*, by Lt.-Col. H. G. C. Swayne. London: Rowland Ward, Ltd.

River, are notable as being the habitat of the Manchurian wapiti (*Cervus canadensis xanthopygus*), distinguished from other wapiti by its reddish summer coat and simpler and smaller antlers. Here, too, is found the Manchurian roebuck (*Capreolus manchuricus*), a near relative of the European species. The Manchurian sika (*Cervus sika manchuricus*), a larger relative of the Japanese deer, also inhabits these districts. In the Usuri valley, and perhaps also in Corea, occurs the handsome Dybowski's deer or Pekin sika (*C. hortulorum*), which takes its second name from having been first described from specimens taken at the sack of the summer palace near that city. An elk perhaps identical with *A. machlis bedfordiae* ranges over part of this area. Amurland and Corea are within the habitat of the long-haired tiger (*Felis tigris mongolica*), which has a wide range in Northern and Central Asia, extending into Corea. A large leopard (*F. pardus villosa*), as well as a brown bear more or less nearly allied to the Kamchatkan race, must, judging from the number of skins exported from China, be common in parts of Manchuria and northern Mongolia.

In the latter country is found the most easterly representative (*Ovis ammon jubata*) of the great argali sheep of Central Asia. The Mongolian or Gobi desert is the habitat of a species of gazelle (*Gazella gutturosa*) which takes its English name from the country, and is characterised by a swelling of the windpipe; and a second species, *G. przewalskii*, is also from Mongolia. Here, too, occurs the chigetai or Mongolian wild ass (*Equus hemionus*), while a race of the nearly allied onager (*E. onager castaneus*) is supposed to come from Kobdo. Mongolia is likewise the home of the true tarpan or wild horse (*E. caballus przewalskii*).

On the western and north-western sides of the Mongolian desert tract the Altai, Tian-Shan, and adjacent ranges are inhabited by various forms of large sheep and deer. From the Sair Mountains to the north-east of Kulja comes a rather small race of argali sheep (*Ovis ammon sairensis*); while in the Altai occurs the true or typical argali (*O. a. typica*). The Pamirs are the home of Marco Polo's argali (*O. a. poli*), which has the longest, although by no means the stoutest, horns of all the group. An allied race (*O. a. karelini*) inhabits the Alatau, to the north of Lake Issik Kul; and there is another nearly related, if not identical, argali in the western Tian-Shan, which has been named *O. a. littledalei*. More information is, however, required with regard to these sheep. The Tian-Shan contains one of the finest representatives of the wapiti (*Cervus canadensis songaricus*); and a second race of the same species, the Baikal wapiti (*C. c. asiaticus*), was described on the evidence of specimens from the Sayansk and Baikal mountains, to the west of Lake Baikal. Yet another race, the Obi wapiti (*C. c. biedermanni*) comes from Lake Teletz and Barnoul, in the Obi valley. The large Asiatic or Siberian roebuck (*Capreolus pygargus*) is typically from the Altai, but is represented by a local race in the Tian-Shan; and the musk-deer (*Moschus moschiferus*) is found in both ranges.

The Tian-Shan race of the Asiatic or Siberian ibex (*Capra sibirica*) carries the finest horns met with in that widely spread species, which is represented by many other races in Central Asia, and whose range extends southwards into Baltistan and Kashmir, where it is respectively represented by *C. s. wardi* and *C. s. sacin*. The gazelle of the Altai seems to be a local

race of the goitred gazelle of Persia, and has been named *Gazella subgutturosa sairensis*.

As regards the rest of the fauna, the following quotation may be made from an article contributed by Mr. Lydekker to *The Field* for 1908 (vol. cxi, p. 151):—

“The wild boar of the Tian Shan was separated in 1875 by Dr. W. T. Blanford, from the typical European representative of the species under the name *Sus scrofa nigripes*, on account of the blackness of the greater portion of both pairs of limbs, and certain presumed peculiarities in the skull. With regard to the validity of the former character, I find that in a Russian wild boar exhibited in the British Museum the front surfaces of the legs are alone black, the colour being elsewhere light brown. The Indian wild boar in the same case has, on the other hand, wholly black legs; but the Tian-Shan swine is quite unlikely to be identical with the Indian species.

“Turning to the Carnivora, I have no information with regard to the tiger of the Tian-Shan, but in articles on animals in the Berlin Zoological Gardens published in last year's *Field* (vol. cx, p. 594) it was pointed out that the Tian-Shan ounce or snow-leopard appears to differ in colouring from the ordinary representative of that species. The existence of an apparently peculiar bear in the Tian-Shan has been known since 1876, when it was described by Severtzow; but till quite recently no skins or skulls appear to have reached this country, although a living specimen was exhibited a few years ago in the Berlin Gardens. Severtzow proposed the name *Ursus leuconyx* for his Tian-Shan bear; but later on Przewalski stated that there were two bears in that range, the one dark brown with white

claws identified with Severtzow's species, and the other a much paler animal, stated to be found only on high, -treeless plateaux, and regarded by Przewalski as inseparable from the Kashmir brown bear (*U. arctus isabellinus*).

“Recently I have had an opportunity of inspecting the skull and skin of a very old male bear from the Tian-Shan, which is clearly identical with the one identified by Przewalski with *isabellinus*. With the exception of a large patch of light brown on the crown of the head, continued as a line down the back of the neck and the middle of the forequarters, the long and shaggy coat is of a pale buff, a deep cream-colour, while the claws are white. In these respects the specimen agrees with the description of a Tian-Shan skull and skin given by Professor T. Noack in the *Zoologischer Anzeiger* for 1903, where they were identified with Severtzow's *leuconyx*. Young Kashmir bears are sometimes almost or quite as light-coloured as the one I have examined, but adults, especially males, are generally much darker.

“This affords a presumption that the Tian-Shan bear is distinct from the Himalayan species; but then comes a difficulty with regard to the dark Tian-Shan bear mentioned by Przewalski. It seems, however, unreasonable to believe in the existence of two Tian-Shan bears, and I am therefore disposed to refer them all to a single race of the brown bear (*Ursus arctus leuconyx*). To what extent this animal varies in colour, either individually or according to age or sex, must be left to sportsmen or collectors to determine.”

Since this was published the writer has come to the conclusion that the Tian-Shan bear is probably an Asiatic representative of the American grisly, in

which case it should be known as *U. horribilis leuconyx*. The probability of this being correct is strengthened by the occurrence of the wapiti in both areas. Corea is inhabited in part by animals of a Central Asian type, among which it will suffice to refer to the tiger, and a representative of the musk-deer, which has been described as a distinct species, characterised, among other features, by its small size and peculiar colouring.

TURKESTAN, BOKHARA, ETC.—Chinese Turkestan is the home of the saikik, or Yarkand, gazelle (*G. yarcandensis*), a larger and longer-eared animal than the goitred gazelle, but likewise lacking horns in the female ; this species is found on the plains of Maralbashi, on the Kashgar tributary of the Yarkand River. The latter locality is also the haunt of a relative of the hangul, or Kashmir stag, known as *Cervus yarcandensis*; and in parts of Russian Turkestan is found a member of the wapiti group (*Cervus canadensis bactrianus*). In the Karatau range of Bokhara occurs *Ovis ammon nigrimontana*, the smallest representative of the argalis. Two-humped Bactrian camels (*Camelus bactrianus*) are found in a wild state in the neighbourhood of Kashgar, but some of them appear to be the descendants of domesticated individuals.

Of the saiga antelope, so abundant on the Kirghiz steppes, mention has been already made under the head of European Russia ; and it will suffice to add that the kulan of the Kirghiz appears to be a local form of the Mongolian chigetai, and that the Indian race of the allied onager (*Equus onager*) extends into Bokhara.

Sand-grouse abound in many parts of Central Asia ; Pallas's sand-grouse (*Syrrhaptes paradoxus*) ranging in summer as far north as Lake Baikal. Game-

birds of various descriptions are of course to be met with throughout these districts; and among them mention may be made of the bearded partridge (*Perdix daurica*), distinguished from the typical species by its paler and greyer colour, and the elongation of the feathers of the chin and neck into a kind of beard. It inhabits the greater portion of North-eastern and Central Asia, extending from the Tian-Shan to Amurland and Manchuria. On the Amu Daria is found Severtzow's pheasant (*Phasianus chrysomelas*), while Shaw's pheasant (*P. shawi*) inhabits Yarkand and Kashgar. Farther north, along the Sir Daria, and thence through Turkestan to the Black Irtish, is found the Mongolian *P. mongolicus*, and still more eastward, in Zungaria, the nearly allied *P. semitorquatus*.

ASIA MINOR, CYPRUS, AND PERSIA.—Access to the mountainous districts of Asia Minor, the home of the wild goat, or pasang (*Capra hircus ægagrus*), may be obtained either from Smyrna on the west, or from Trebizond through Erzerum on the north. In addition to the wild goat, which ranges eastwards through Persia to Sind, these mountains are inhabited by a local race of the chamois (*Rupicapra tragus asiatica*). Anatolia and the Erzerum district of Armenia are the haunts of the red Gmelin's wild sheep (*Ovis orientalis*), a smaller race of which (*O. orientalis ophion*) inhabits the Troödos Mountains in the interior of Cyprus. Throughout the forest-districts of Asia Minor, as well as in the Caspian provinces of Persia, the maral, or eastern red deer (*Cervus elaphus maral*), is a well-known animal; and roebuck are found in northern Persia. On the other hand, the Persian fallow deer (*Cervus mesopotamicus*) is a native of Mesopotamian Persia, at the head of the Persian Gulf, one well-known locality

being the province of Luristan. The antlers of this species are markedly different from those of the ordinary fallow deer. A local form of Gmelin's sheep frequents the southern slopes of the Elburz range; and in the Kopet-Dagh range, dividing Persia from Turkestan, is found a peculiar race of urial (*O. vignei arkal*), this race being quite distinct from those respectively inhabiting Baluchistan and the Punjab. Gazelles are represented by the goitred species (*Gazella subgutturosa*), and in Seistan by the allied *G. seistanica*, and also by Kennion's gazelle (*G. fuscifrons*), which is more nearly related to the Indian gazelle, the females having horns. The range of the last-mentioned species extends into Baluchistan. Wild boars (*Sus scrofa*) are everywhere abundant, but nowhere more so than in the oak-forests of Shiraz and Mesopotamia. In the latter district they afford food to numerous lions (*Felis leo persica*), which especially affect the west flanks of the Zagros Mountains east of the Tigris valley, as well as the wooded ranges south and south-east of Shiraz, but are unknown in southern Persia and Baluchistan. A local race of the tiger (*Felis tigris septentrionalis*) is common, but is restricted to the Caspian provinces of northern Persia and the Caucasus; and in the former area there is also a small-spotted and thick-tailed leopard (*F. pardus tulliana*) which approximates in appearance to the ounce. Smaller cats are not uncommon; the hunting-leopard (*Cynælurus jubatus*) is met with in certain districts, and the long-tailed red lynx or caracal (*Felis caracal*) in the Mesopotamian provinces. Wolves, jackals, and foxes of various kinds range all over the country, and the pale-coloured Syrian brown bear (*Ursus arctus syriacus*) is found from south-western Persia through the Shiraz district and Mesopotamia

to the head of the Mediterranean in Syria. The typical onager, or ghor-khar (*Equus onager*), one of the wild asses, is a native of western Persia, to the south of the Caspian, and the Indian race of the same (*E. o. indicus*) ranges from Sind through eastern Persia to Bokhara. Many of the birds of Asia Minor and Persia serve to connect those inhabiting southern Europe with those of India. The raptorial species include vultures and eagles of several kinds, the lammergeier, and the peregrine and other falcons. Sandgrouse are common on the open plains of Persia and Baluchistan; and the pheasant (*Phasianus colchicus*) abounds in the forests of the Caspian provinces. The partridge (*Perdix cinerea*) extends as far east as Asia Minor and northern Persia, and the francolin, or black partridge of Indian sportsmen (*Francolinus vulgaris*), which also inhabits Cyprus, is met with in Palestine, Asia Minor, and the whole of Persia. whence it extends through Baluchistan to India. The Indian grey partridge, or francolin (*F. pondicerianus*), replaces the ordinary partridge in the south of Persia, and the oriental Bonham's sisi partridge (*Ammoperdix bonhami*) is found as far east as the Euphrates valley. The chukor (*Caccabis chucar*), which seems to be only a variety of the rock red-legged partridge (*C. saxatilis*), is likewise common in Persia; and the Caspian snow-cock (*Tetraogallus caspius*) inhabits the mountains of Asia Minor and the higher ranges near Shiraz. Quail (*Coturnix communis*) are abundant in all the cultivated fields while the crops are green, but in winter leave the Persian highlands for India. The wading-birds and water-fowl on the numerous rivers and lakes include flamingoes, wild duck, teal, pintail, wigeon, pochards, scoters, golden-

eye, sheldrake, geese, and swans, the last being especially abundant on the Caspian during winter. Woodcock haunt the rose-gardens of Persia, and three kinds of snipe visit the country in winter. The bustard is abundant in the Meshed district of northern Persia; the little bustard (*Otis tetrax*), common in the countries to the west of the Caspian, has been obtained near Tehran; but Macqueen's bustard (*Hubara macqueeni*) is the common Persian species, being a summer visitor to the central plateau, where it breeds.

SYRIA AND ARABIA.—Before taking into consideration the animals of Baluchistan and Afghanistan, it will be convenient to devote a short space to those of Arabia. As regards both its animals and plants Arabia forms an almost complete transition from Europe and Northern Asia on the one hand to Africa on the other; the fauna of its northern districts being of an Euro-Asiatic type, whereas that of its southern half (except in the mountains) is as distinctly African.

Of horned game there are several kinds, one of the most noticeable being the Arabian tahr (*Hemitragus jayakeri*), inhabiting the mountains of Oman, and nearly allied to the larger Himalayan species. The beden, or Nubian ibex (*Capra nubiana*), also found in the highlands of Northern Africa, inhabits all the mountain-ranges, from those of the Sinaitic Peninsula in the north to Hadramaut in the south. Gazelles include the common *Gazella arabica*, the Muscat gazelle (*G. muscatensis*), and the Marica gazelle (*G. marica*), which is allied to the goitred species, but has horns in the female. The most interesting of all is, however, the Arabian oryx (*Oryx beatrix*), the smallest member of the gemsbuck group, which inhabits the central desert of Nejd.

Syria and Palestine have two gazelles, the dorcas (*G. dorcas*) and Merrill's gazelle (*G. merrilli*); the former being an inhabitant of the plains, and migratory, while the latter is a native of the mountains bordering the Dead Sea. Baboons belonging to the African genus *Papio* are met with in Southern Arabia, and the Asiatic striped hyæna (*Hycæna striata*), as well as jackals, occurs throughout the country; but the lion appears to be nearly, if not completely, exterminated. The presence of the little Syrian hyrax (*Hyrax*, or *Procavia, syriacus*), the coney, i.e. rabbit, of the Bible, which is met with in rocky districts, also connects the fauna with that of Africa. The light-coloured Syrian bear (*Ursus arctus syriacus*), although met with in Palestine, does not appear to extend into Arabia, where the nature of the country is unsuited to its habits. Game-birds are not numerous, the chief being the black-headed partridge (*Caccabis melanocephala*), the largest of the "red legs," whose range extends from the neighbourhood of Jedda and Mecca to Aden, and Hey's sisi partridge (*Ammoperdix heyi*), common to both shores of the Red Sea. In addition to these, flights of quail and of more than one species of sand-grouse visit the country at certain seasons.

BALUCHISTAN AND AFGHANISTAN.—These two small countries serve, both geographically and zoologically, to connect Persia with the Punjab and Sind, having few, if any, absolutely peculiar species of large animals. For this reason, coupled with the circumstance that Afghanistan is practically a closed country to English sportsmen, a short notice will suffice. Urial sheep are found throughout the hilly districts of both countries. of which the Baluchistan form (*O. vignei blanfordi*) is a

distinct race, from which the one inhabiting Afghanistan appears inseparable. Two races of the straight-horned type of the markhor, or spiral-horned goat, inhabit Afghanistan, namely the Cabul markhor (*Capra falconeri megaceros*) in the north, with wider horns, and the Suleman markhor (*C. f. jerdoni*), in which the horns form an absolutely straight spiral, in the south-east. The latter race also extends to the Punjab side of the Suleman range in the neighbourhood of the stations of Dera Gazi Khan and Banu. A race of the wild goat (*C. hircus blythi*) inhabits Baluchistan and the adjacent districts of Sind; and, as previously mentioned, Kenion's gazelle extends from Seistan into the former country.

KASHMIR AND ADJACENT TERRITORIES.—Some forty years ago, and in certain districts to a later period, the territories under the rule of the Maharaja of Kashmir, which include Jamu, Punch, Kashmir, Gilgit, Baltistan, and Ladak, and with which Chitral and Chilas may be associated, were a paradise for sportsmen. But, partly owing to legitimate sport, and partly to other methods of destruction, the game was so reduced that some years ago certain species were in danger of extermination.

Matters have, however, been changed of late years for the better by the establishment of forest-laws, which have done much in replenishing the stock of large game, although it is doubtful if this will ever be equal to what it was formerly. In the Maharaja's territories the animals vary in correlation with the degree of elevation of their haunts above sea-level, and according as to whether these lie within or beyond the influence of the Indian monsoon. The outer ranges of the Himalaya, in the districts of Jamu and Punch,

have, for instance, a fauna approximating more or less closely to that of the Punjab ; while more northern Asiatic types occur in the high ranges of the Pir-Panjal and Kajnag, and those on the northern side of the valley of Kashmir. On the other hand, after crossing the snowy range forming the northern barrier of the Kashmir valley, the sportsman enters an arid and almost rainless district with a fauna and flora of the Tibetan type. The Astor and Baltistan districts, which obtain a certain amount of moisture by way of the Indus valley, are, however, less arid than Ladak, and accordingly exhibit a less marked approximation to the typical Tibetan fauna.¹

For such portions of the Himalaya as lie within the influence of the monsoon, March, April, May, and the first half of June are the most favourable months for big-game shooting ; the second half of June, July, and August being in general so rainy that no sport is to be obtained. From the beginning of September to the close of November the weather, as a rule, is perfect, but the vegetation is rank. These are the months for pheasant-shooting. December, January, and February are cold, with much snow at all elevations over 7000 feet. The Himalaya beyond the action of the monsoon may be visited at all seasons of the year, unless the way be barred by snow.

In the valley of Kashmir January and February, if the snow be deep, are excellent for deer-shooting ; and March is a good time to get fine stags, which then come low down to graze on the fresh grass. The latter half of April, the whole of May, and the early part of June form the proper season for markhor and ibex.

¹ For the big game of the district see *Sport in the Highlands of Kashmir*, by H. Z. Darrah. London : Rowland Ward, Ltd.

From the middle of June to the middle of September little can be done in the valleys adjacent to Kashmir, all the animals being then able to wander over the mountain-tops, which are clear of snow, and the coats of the bears are valueless. These months, on the other hand, are the season for Ladak and Baltistan. Between the middle of September and the beginning of November the stags are calling and returning from their summer retreats to lower levels in Kashmir, and bears begin to be worth shooting. Chukor, too, are at this season to be found on the lower hills.

During November and December a drawback to shooting is found in the condition of the grass, which at this season is long, dry, and wiry, and consequently slippery under the tread. Red bears also are hibernating. An early snowfall, however, remedies the first evil, and also causes the stags to descend. On the Walar Lake of Kashmir wild-fowl are excessively numerous, but from being constantly harassed by the native boatmen, will not allow a boat to approach.

The number of kinds of game animals—fur and feathered—occurring within the limits of Kashmir territory is so large, that to mention all is impossible, and other animals must, in the main, be ignored. In the outer hills many of the species are common to the plains of India, and these, for the most part, are accordingly not mentioned in this place, attention being concentrated on those peculiar to the country and other parts of the Himalaya.

In the forest-districts of the outer Himalaya and the lower parts of the valley of Kashmir the Himalayan black bear (*Ursus torquatus*) is a well-known animal, whose range extends westwards to the confines of Persia. The Kashmir race of the serow (*Nemorhædus*

sumatrensis humei), and its smaller relative the goral (*Urotragus goral*) are also inhabitants of this zone. This, too, is the home of the tahr (*Hemitragus jemlaicus*), whose range extends from the flanks of the Pir-Panjal range to Sikkim. At and above elevations of about 8000 feet, the musk-deer (*Moschus moschiferus*) is to be met with throughout the extent of the Himalaya, while northwards it ranges, in suitable localities, through Central Asia into Siberia. The Pir-Panjal and Kajnag ranges form the south-easterly limits of the habitat of the markhor, which appears to be bounded to the east by the Chinab valley. The race inhabiting the two ranges just mentioned is *Capra falconeri cashmiriensis*; but in Astor and Baltistan this race is replaced by *C. falconeri typica*, in which the horns form a still more open spiral. This or an allied race extends into Gilgit, and the species is likewise represented in Chitral and Chilas, where splendid heads occur.

In Gilgit markhor-shooting begins about December 20th, when the males, under the influence of the breeding season, come down from the high crags where they have been in retreat, to join the herds, which constantly remain at lower levels.

The typical race of the Kashmir stag, or hangul (*Cervus cashmirianus*), commonly known as the barasingha, although that name properly belongs to a very distinct Indian species, is restricted to the valley of Kashmir and the districts immediately adjacent. The higher mountains of Kashmir and the districts to the north are the home of the Himalayan brown or snow bear (*Ursus arctus isabellinus*), often known as the red bear, which extends as far west as Astor and Gilgit, and eastwards to Nepal, but is unknown in Suru, Zaskar, and Ladak. A pale race of the lynx

(*Felis lynx isabellina*) ranges from Gilgit through Baltistan to Ladak; and the beautiful ounce, or snow leopard (*Felis uncia*), is found throughout the arid districts, ranging from the Altai to Tibet. The ordinary leopard, which is not uncommon in Kashmir, does not in all probability range beyond the forest districts. Wild dogs are found alike in the forests and on the open plains of Ladak, and in all situations are detested by the sportsman on account of disturbing or destroying the game. Wolves abound in certain districts, and in Ladak there is a black phase of the Tibet wolf (*Canis lupus laniger*), whose thick fur can be made into handsome rugs.

Reverting to horned game, the Astor district, where it is known as urin, is the home of the typical race of *Ovis vignei*, but in Ladak the same species of sheep bears the name of sha, or shapo. From near Shigar, in Baltistan, and westwards to Tibet and northwards to the Kuen-lun and Altyn Tagh, is found, at high elevations, one of the most characteristics of Tibetan ruminants, the blue sheep, or bharal (*Ovis nahura*), whose smooth horns are so unlike the other Asiatic members of the same genus. Incomparably the finest of all the sheep found within these territories is, however, the Tibetan argali (*Ovis ammon hodgsoni*), which is still to be met with in Changchenmo and the other more remote districts of Ladak. In these desolate regions the sportsman is in the midst of the typical Tibetan fauna, among which the following species may be mentioned. The yak (*Bos grunniens*), whose horns form the blue ribbon of the sportsman in these districts, was formerly to be met with in Changchenmo, but, according to Major R. L. Kennion, is now to be found only in Tibet proper, where it is abundant.

Eastwards its range extends to the Kuen-lun and Kansu. Although much smaller, an equally striking and characteristic Tibetan ruminant is the chiru, or Tibet antelope (*Pantholops hodgsoni*), which has much the same range as the yak, and whose long horns form some of the most graceful of sporting trophies obtainable in Asia. Much smaller and more curved are those of the goa, or Tibetan gazelle (*Gazella picticaudata*), which also inhabits the same districts. The kiang, or Tibetan wild ass (*Equus kiang*), likewise abounds in Eastern Ladak, whence it extends into Tibet.

The sacin or Asiatic ibex (*Capra sibirica*), although abundant in Baltistan, where it is represented by the race known as *C. s. wardi*, extends up the Indus valley in Ladak, but does not occur in Tibet proper. In the ranges north of the Kashmir valley it is represented by a variety (*C. sibirica sacin*), which extends along the Himalaya about as far as the Ganges valley. There are, however, no ibex on the Pir-Panjal and the Kajnag ranges.

Regarding the smaller mammals met with in Kashmir territory, a few words must suffice. Hares, chiefly of the species *Lepus oiostolus*, are exceedingly abundant in the higher districts of Ladak, wherever low bush occurs in sufficient quantity to afford them cover. Red marmots (*Arctomys caudata*) occur on the summit of the range to the north of the Kashmir valley, and this or other species are met with throughout Ladak and Baltistan at high elevations. Their fur, although highly coloured, is too short and stiff to be of much use. The Astor and Gilgit district is the home of the large and rare grey flying-squirrel (*Eupetairus cinereus*), the sole member of its genus. The beautiful Indian marten (*Mustela flavigula*) is not to be met

with beyond the forest-districts. In the latter, even at elevations where snow rests for a considerable portion of the year, two species of monkeys occur, namely a langur (*Semnopithecus*) and a macaque (*Macacus*). Flying-squirrels are abundant wherever there are trees ; and a palm-civet (*Paradoxurus grayi*) has been found in the Kashmir valley.

As regards feathered game, the forest-districts of Kashmir territory, although far less rich in the pheasant tribe than those farther to the east, have much to attract the sportsman. Most splendid of all is the monal (*Lophophorus refulgens*), whose range extends from eastern Afghanistan to western Bhutan, in elevated forests. Sand-grouse are represented in eastern Ladak by *Syrrhaptes tibetanus*, which is still more common in Tibet. Grouse and ptarmigan are unknown, but the snow-partridge (*Lerwa nivicola*) inhabits the crests of the higher ranges, which are also the home of the Tibetan snow-cock (*Tetraogallus tibetanus*). Chukor (*Caccabis chucar*) are to be found throughout the territory, from the forest-clad outer hills to the deserts of Ladak. Hodgson's partridge (*Perdix hodgsoniae*) occurs sparingly in Kashmir and parts of Ladak ; and quail-shooting may be had in the middle and outer hills about the time the maize is cut. These latter ranges, from Hazara to Nepal, are likewise inhabited by the white-crested kalij pheasant (*Gennæus albocristatus*) ; while in Chamba we enter the range of the typical koklass (*Pucrasia macrolophus*). In many of the wooded valleys fair woodcock-shooting is to be obtained at certain times of the year. In Ladak blue rock pigeons are extraordinarily abundant, and afford good shooting for the pot. The abundance of water-fowl on the Walar Lake has been already

mentioned ; and here is to be found the beautiful water-pheasant, or jacana (*Hydrophasianus*). Kingfishers, some blue and others pied, are to be seen on every river ; while the long-tailed paradise flycatcher (*Terpsiphone*) as well as long-tailed magpies, cannot fail to attract attention in the forest-districts of the outer hills. Birds-of-prey are numerous, ospreys (*Pandion*) being frequently seen in the river-valleys, while eagles and vultures abound everywhere.

Lastly, mention must be made of mahseer-fishing, a sport which may be enjoyed either in the outer hills, especially in the Punch district, or in the Jhelam within the valley of Kashmir itself. Of late years European trout have been introduced into some of the Himalayan rivers.

TIBET AND SZE-CHUEN.—As the fauna of Sze-chuen and Kansu is closely connected with that of Tibet, it will be convenient to consider the two together.

Dr. W. T. Blanford, who laid stress on the isolated character of the Tibetan mammals, regarded all of them as belonging to a single fauna, inhabiting the open plateau at a great elevation, from about 13,000 feet upwards. He included, for instance, in the typical plateau fauna such animals as the takin and the great panda, and was of opinion that the shou and the Himalayan black bear did not occur in Tibet at all. Later explorations have, however, made it clear that there are two distinct faunas, namely, that of the desert plateau at a great elevation, and that of the jungle country at a much lower level, in the eastern districts, reaching down to 8000 feet or less in the Chinese province of Sze-chuen.

As Mr. Lydekker has shown in the *Field*, the plateau fauna, which commences in the Changchenmo district

of Ladak, includes the yak, the chiru, the goa, the bharal, the Tibetan argali, the kiang, the snow-leopard, the manul cat, and the Tibetan wolf and lynx ; all of these being peculiar species or races, and several representing genera or subgenera unknown elsewhere. Whether the little Tibetan blue bear (*Ursus pruinosus*) belongs to the plateau or the eastern jungle fauna is unknown.

This plateau fauna extends as far east as Lhasa (and probably farther), but some distance to the south-east of that city we come apparently on the frontiers of the jungle fauna, in the valley of the San-po or Bramaputra. It is stated, for instance, by Colonel Iggulden, in the *Field* of October 27th, 1906, that the shou or a closely allied large stag occurs in this neighbourhood, and there are probably other members of the eastern or jungle fauna—although definite information with regard to their occurrence is wanting—till the extreme east of Tibet and Sze-chuen are reached. Here, in the bamboo and rhododendron jungles, at heights of 8000 feet and upwards, are found the takin, various kinds of serow and goral, the great panda, and the Himalayan black bear, together with a pale race of the Kashmir hangul discovered by Major McNeill, the Asiatic ocelot, and the Tibetan striped cat. At still lower elevations, apparently, are met with the Sze-chuen sambar and Malay bear, together with the typical or long-tailed panda and other members of the fauna of the Eastern Himalaya and the Malay countries.

Referring more fully to some of the above-mentioned species, the Sze-chuen takin (*Budorcas tibetanus*) differs in colour and the form of its horns from the typical Mishmi takin mentioned later. Specimens were shot

in Sze-chuen a few years ago by Mr. J. W. Brooke. Serows are represented in Sze-chuen by the white-maned species (*Nemorhædus argyrochaetes*), of which the typical locality appears to be the mountains bordering the Yang-tsi-kiang, and also by *N. milnedwardsi*; while of goral, we have the ashy species (*N. griseus*), represented by local races in Central China and Burma. As yak are stated to occur in Kansu, they are probably also found in some part of Sze-chuen. Deer are represented in Sze-chuen and the adjacent forest-districts of Tibet by a race of the wapiti (*Cervus canadensis wardi*), a large form of sambar (*C. unicolor dejcani*), the aforesaid pale race of the hangul (*C. cashmirianus macneilli*), locally known as the white deer, the tufted deer (*Elaphodus cephalophus*), and the Sze-chuen muntjac (*Cervulus lachrymans*). The Kansu musk-deer, which probably ranges into the adjacent province, has been described as a distinct species (*Moschus sifanicus*).

Among the Carnivora the Sze-chuen leopard has been distinguished as *Felis pardus grayi*; and the smaller cats of the region include the species which has been called the Asiatic ocelot (*F. tristis*), and the smaller but allied *F. scripta*. The two last, which have very handsomely marked skins, are probably forest animals; but the long-haired manul cat (*F. manul*) of Tibet frequents open country. Reference has been already made to the small Tibetan blue bear (*Ursus pruinosus*), and in the Sze-chuen district there are two other members of the same genus, namely, a race of the Himalayan black bear (*U. torquatus macneilli*) and one of the bruan or Malay bear (*U. malayanus wardi*); this Malay element in the fauna being paralleled by the case of the ashy goral. The most interesting of all the Carnivora of the district is, however, the parti-

coloured bear or great panda (*Æluropus melanoleucus*), which is a short-tailed black and white animal, representing a genus confined to Sze-chuen and Kansu, where it inhabits the same bamboo and rhododendron jungles as the takin. The much smaller and long-tailed panda, which also forms a genus by itself, is represented in Sze-chuen by a very dark-coloured race, *Ælurus fulgens styani*.

The country under consideration is the home of the largest species of flying-squirrel (*Pteromys*), and likewise by far the biggest of the bamboo-rats (*Rhizomys*). Lastly, magnificent skins are afforded by the males of the golden snub-nosed monkey (*Rhinopithecus roxellanae*), which abounds in the forests of Sze-chuen, and is represented by two allied species in Tonkin and the neighbouring countries. Old males, which are much larger than the females, develop very fine fur in winter; the long golden hair of the back forming silk-like tresses of surpassing beauty and softness.

With some difficulty entrance can be effected into Sze-chuen from Central China; but Tibet is practically a closed country, and it is only occasionally that a specially enterprising sportsman manages to cross the border, to be stopped sooner or later by Tibetan or Chinese soldiery. A few Tibetan game-birds are mentioned under the heading of China.

CHINA AND FORMOSA.—Apart from Sze-chuen and Kansu, discussed in the foregoing paragraphs, China is little known as a shooting country, although of late years good sport has been enjoyed by several British sportsmen in the mountains of the central districts; and as the country becomes more accessible to Europeans, it is probable that more will be obtained

in the future. The imperial hunting-pack near Peking formerly contained herds of Dybowski's deer, or Peking sika (*Cervus hortulorum*), and of the milu, or Père David's, deer (*Elaphurus davidianus*); but the home of the former is, as already mentioned, Manchuria, while that of the latter is unknown. In the Yang-tsi valley are found the hornless Chinese water-deer (*Hydropotes*, or *Hydrelaphus*, *inermis*), and a variety of the Peking sika (*C. hortulorum koppschi*). There are several species of muntjac inhabiting China, the most remarkable being the hairy-fronted *Cervulus crinifrons* from the neighbourhood of Ningpo. The other species include *C. sclateri*, *C. reevesi*, and *C. bridgemani*, all of which occur in the An-wei district, where the third and darkest dwells high up in the mountains. There are likewise two tufted deer, *Elaphodus ichangensis*, from the mountains of the Ichang district, and *E. michianus* from the neighbourhood of Ningpo; and the golden takin (*Budoreas bedfordi*) of southern Shen-si.

A race of the sambar (*Cervus unicolor swinhoei*) inhabits Formosa; and the same island has also a species of sika deer (*C. taiwanus*); while Hainan possesses a variety of the thamin (*C. eldi platyceros*). Tigers and leopards are to be met with in various parts of China, and in Foochow is found a grey phase of the bay cat (*Felis temmincki dominicanorum*). Formosa is inhabited by a race of the Malay bruin (*Ursus malayanus formosanus*).

Passing on to birds, mention may be made of a species of blood-pheasant (*Ithagenes*) from the western provinces of China, represented by an allied form in Tibet. Tragopans or horned pheasants (*Tragopan*) occur in several parts of the country, as well as a monal (*Lophophorus lhuysii*) in the western districts. Hodg-

son's eared pheasant (*Crossoptilum tibetinum*) is likewise found in Western China and Tibet; and the lovely silver pheasant (*Gennæus nycthemerus*) is an inhabitant of the southern principalities. True pheasants are represented by the white-ringed bird now so common in English coverts; while the Nan-Shan range possesses a second species (*Phasianus satscheuensis*), and Formosa a third (*P. formosanus*). Other members of the genus are Elliot's pheasant (*P. ellioti*) from the mountains of the north-east, and Reeves's pheasant (*P. reevesi*) from the northern districts; the golden and Amherst's pheasants (*Chrysolophus pictus* and *amherstiae*) inhabiting the mountains of Eastern Tibet and the west and south of China. To mention the other species of game-birds as well as of water-fowl inhabiting China would exceed limits of space; and it must suffice to say that quail and snipe are abundant in suitable districts, while ducks swarm on the waters. Among the latter group the bizarre but lovely mandarin-duck (*Æx galerita*) must claim specific mention.

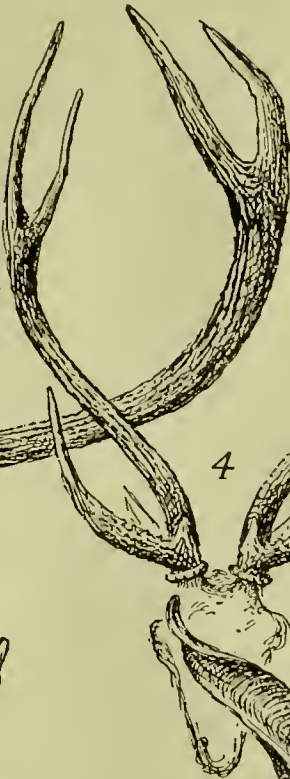
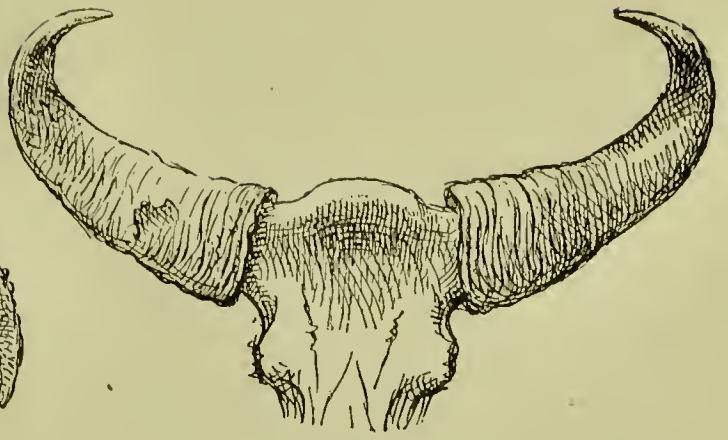
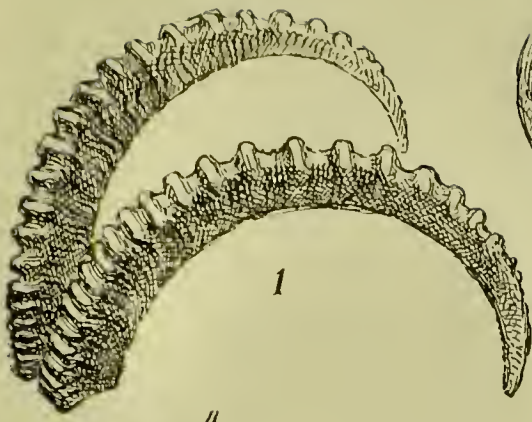
The Yang-tsi-kiang is inhabited by the one Old World alligator (*Alligator sinensis*).

INDIA.—As a field for sport, India, inclusive of the adjacent independent territories in the eastern Himalaya, claims a front place among the countries which go to form the British Empire; and in many districts such sport is obtainable with less difficulty, and under conditions of greater comfort than in most parts of the world. With proper introductions, the means and appliances of sport can be obtained in all the game-producing districts, and the traditional hospitalities of the East enjoyed. The number of British sportsmen and travellers who now visit India is, however, so large

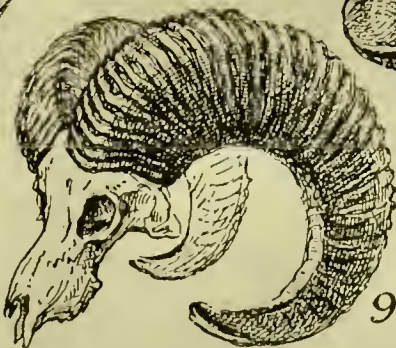
INDIA

1. Asiatic Ibex. *Capra sibirica*.
2. Gaur or Indian Bison. *Bos gaurus*.
3. Sambar. *Cervus unicolor*.
4. Chital. *Cervus axis*.
5. Swamp-deer. *Cervus duvauceli*.
6. Tahr. *Hemitragus jemlaicus*.
7. Serow. *Nemorhædus sumatrensis bubalinus*.
8. Suleman Markhor. *Capra falconeri jerdoni*.
9. Tibetan Argali Sheep. *Ovis ammon hodgsoni*.
10. Cabul Markhor. *Capra falconeri megaceros*.

* * For measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.



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that it is impossible for all to be entertained in the old-fashioned way, as to do so would entail too severe a tax, both on the native princes and on British civil servants holding high positions.

Having already treated of Kashmir and the Gilgit district (p. 168) as well as Baluchistan and Afghanistan, Sind and the Punjab will form the limits of the present area to the north-west; while to the north-east the main chain of the Himalaya to the southward of Tibet, and the valley of Assam in the extreme east, will mark its boundaries in this direction. This immense area, even including the higher Himalaya, presents an enormous variation of climatic and physical conditions; the dry plains of the Punjab and Rajputana being as unlike the teeming moist forests of the Terai of Bhutan and Nepal as it is possible to conceive; while the elevated plateau of the Deccan is different in all respects from the low swamps of the Bengal Sandarbans. To a great extent these different tracts have more or less distinct faunas, but since a number of animals are common to a large portion of the area as a whole, it would entail much repetition to treat of the country entirely according to districts; and the following notes consequently refer in some cases to the local faunas and in others to the animals of the area as a whole.

The north-western portion of India is inhabited by several species properly belonging to the Himalayan and Central Asian fauna. On the eastern flanks of the Suleman range occurs, for example, the Suleman markhor (*Capra falconeri jerdoni*), while a race of the wild goat (*C. hircus blythi*) inhabits the hills of Sind. In the Salt Range of the Punjab, as well as in the Attok Hills, is found the typical urial (*Ovis vignei cycloceros*), which really forms only a local race of the

shapo of Ladak ; and a race of the onager (*Equus onager indicus*) inhabits the deserts of Sind and Cutch. Gorals and serows, the latter represented by at least one local race, as well as tahr and musk-deer, are to be met on the southern side of the main Himalayan axis to the south-eastward of Tibet ; but there are no markhor, and ibex are not met with east of the Satlej valley. Probably, however, in the Nepal district a few bharal are to be found to the south of the snowy range. The occurrence of that magnificent stag the shou (*Cervus affinis*) somewhere in the neighbourhood of Lhasa, has been already referred to, but its typical locality appears to be the Chambi valley. The Mishmi Hills, within sight of the Assam valley, are inhabited by the typical takin (*Budorcas taxicolor*), but these districts are inaccessible to English sportsmen. A smaller race of the same species (*B. t. whitei*) is found in Bhutan. The Terai, or moist tropical forest district of Bhutan and Nepal, is the habitat of several animals unknown in peninsular India, although some range into Burma and the Malay countries. Among these are the beautifully coloured cat-bear, or panda (*Ælurus fulgens*) and the funereal-looking binturong (*Arctictis binturong*), remarkable for the prehensile nature of its long tail. The curious hog-badger (*Arctonyx collaris*) as well as the brown ferret-badger (*Helictis orientalis*) are likewise denizens of the base of the Eastern Himalaya. Here, too, occurs the handsome clouded leopard (*Felis nebulosa*), which is really a Malay type, related to the aforesaid Asiatic ocelot of Sze-chuen ; and another Malay type is represented by the beautifully spotted and lithe linsang (*Linsanga pardicolor*). The hulok gibbon (*Hylobates hwloc*) enters India in the hill-ranges south of Assam. But the grandest animal of this

district is the great Indian rhinoceros (*R. unicornis*), which is found in the giant grass-jungles of the Assam plain, whence it extends west of the Tista river into Nepal territory, where it is abundant, although not known farther east. On the other hand, the Sumatran rhinoceros (*R. sumatrensis*) ranges into Assam from the countries to the east. The pigmy hog (*Sus salvanius*) is confined to the Terai of Bhutan, Sikhim, and Nepal. From Nepal to Gilgit, and thence into Kashmir, occurs a variety of the fox (*Canis vulpes montanus*), while the wolf (*C. lupus*) enters the Punjab.

Turning to birds, it is noteworthy that, in addition to Kashmir territory, the Sub-Himalayan and Terai area is the only part of India where members of the pheasant tribe, other than peacock and jungle-fowl, are met with, although members of the genus *Phasianus* itself are absent. One species of peacock-pheasant (*Polyplectrum*) extends from Assam to Sikhim; and the chir-pheasant (*Catreus wallichi*) is found from Nepal to Chamba, while the koklass (*Pucrasia macrolopha*) ranges from the former districts to Kashmir. Three species of kalij pheasant (*Gennæus*) also occur in the Eastern Himalaya; the monal (*Lophophorus refulgens*) frequents the higher ranges, and the gorgeous tragopans or horned pheasants (*Tragopan*) are to be met with throughout the area. The blood-pheasant (*Ithagene cruentus*) inhabits the pine-forests of Nepal, Sikhim, and Bhutan; and the rare mountain-quail (*Ophrysia superciliosa*) has been shot at Mussuri and Naini-Tal. In Assam the sportsman may shoot the shy bamboo-partridge (*Bambusicola fitchei*), as well as hill-partridges (*Arboricola*) which are common to the Sub-Himalaya and the Malay countries. Chukor (*Caccabis chucar*) extend as far east as Nepal, but are

not met south of the Punjab and the Sub-Himalaya. The Salt Range and some other hills in the Punjab are the habitat of the sisi partridge (*Ammoperdix bonhami*). The black-bellied *Pterocles arenarius* and the large pin-tailed sand-grouse (*Pteroclorus alchata*)



HEADS OF INDIAN RHINOCEROS FROM THE TROPHY OF
COOCH-BEHAR. BY ROWLAND WARD.

occasionally straggle as far south as Delhi and Lucknow, but are found more abundantly in the dry plains of Cutch, Sind, and the Punjab. On the other hand, the ordinary sand-grouse (*Pteroclorus exustus*) has a much more extensive range, being met with in numbers in the Deccan and the United Provinces. The little bustard (*Otis tetrax*) only enters India in the north-

western Punjab, although other bustards extend to the south.

With these remarks on groups more or less restricted to the north-west and northern districts, attention may be directed to other Indian animals,



HEAD OF ARNA, OR INDIAN BUFFALO, FROM THE TROPHY
OF COOCH-BEHAR. BY ROWLAND WARD.

which will be taken in zoological order. As regards monkeys, it will suffice to say that both the macaques (*Macacus*) and langurs (*Semnopithecus*) are chiefly or exclusively Indo-Malay types, being unrepresented in Africa south of the Sahara. Of the sleepy-looking lorises, one species (*Nycticebus tardigradus*) extends from Assam to the Malay countries, while the second

and smaller kind (*Loris gracilis*) is found in the forests of Southern India and Ceylon.

India, it is almost superfluous to observe, is the home of many of the larger Carnivora. In addition to the tiger (*Felis tigris*), of which the typical race is found throughout the country, a race of the lion (*F. leo gujratensis*) formerly inhabited a considerable area, although it is now restricted to the Gir forest of Kathiawar, where it is rare. The leopard, or panther (*F. pardus*), is ubiquitous. Among smaller species are the marbled (*F. marmorata*), fishing (*F. viverrina*), leopard (*F. bengalensis*), and jungle (*F. chaus*) cats. Although everywhere rare, the red caracal (*F. caracal*) occurs in most districts except the Malabar coast; while the hunting-leopard, or chita (*Cynælurus jubatus*) has a wide range, but is unknown in the extreme south. Civets (*Viverra*) and tody-cats or palm-civets (*Paradoxurus*) occur wherever there are trees; and species of mongoose (*Herpestes*) are to be met with all over the country. That skulking brute the striped hyæna (*H. striata*), although seldom seen, likewise wanders all over the plains; the jackal-like Indian wolf (*Canis pallipes*) replaces the European species south of the Punjab, while jackals themselves (*C. aureus*) are everywhere to the fore. Equally wide in its distribution is the Indian dhole or wild dog (*C. sumatrensis deccanensis*); and small foxes (*C. bengalensis* and *leucopus*) inhabit the more open or desert districts. Omitting martens and weasels, mention may be made of the Indian ratel (*Mellivora ratel*), the Indian race of the otter (*Lutra vulgaris nair*), and the small clawless otter (*L. leptonyx*). One of the most characteristic of all Indian Carnivora is the well-known sloth-bear, or aswal (*Melursus ursinus*), which is peculiar to the

country, where it is to be met with everywhere in suitable districts.

To refer to the host of bats, insect-eating, and rodent mammals of India, would occupy too much space, but it may be mentioned that fruit-bats, or flying-foxes (*Pteropus*), are abundant wherever there are trees, and that three species of hare occur on the plains, of which the black-naped *Lepus nigricollis* is easily recognised by the feature from which it takes its name. Porcupines (*Hystrix leucura*) near akin to the European species abound, but rarely show themselves above ground in daylight; and flying-squirrels make their presence known around the camp-fire by their shrill cries.

Among large game other than Carnivora, the Indian or Asiatic elephant (*Elephas maximus*) naturally claims first mention. At the present day this magnificent beast is found in a wild state along the base of the Himalaya as far as Dehra Dun, as well as locally in the forest between the Ganges and Kistna, as far west as Bilaspur and Mandla, in the Western Ghats as far north as lat. 17° or 18°, and likewise in some of the forest-clad parts of Mysore and the districts still farther south. Two of the species of rhinoceros occurring in India have been already mentioned; the third is the one-horned Javan *Rhinoceros sondaicus*, which is found from Assam to the Sandarbans and certain other parts of Eastern Bengal; its Chittagong representative forming a distinct race (*R. s. lasiotis*). Of the *Bovidæ*, the lordly gaur, commonly called bison (*Bos gaurus*), frequents Assam and all the great forest-tracts of the peninsula; while the buffalo (*B. bubalis*) is found wild in the grass-jungles of the plains of the Ganges and Bramaputra, from Assam to Rohilcund,

as well as those of Orissa and the eastern Central Provinces, the straight-horned race (*B. b. macroceros*) being apparently peculiar to Assam. The only representative of the sheep and goats in peninsular India is the Nilgiri tahr or ibex (*Hemitragus hylocrius*), the wariatu of the natives, found alike in the Nilgiris and the Anamalais. Next comes the nilgai, or blue-bull (*Boselaphus tragocamelus*), a characteristic Indian antelope, ranging from the foot of the Himalaya to the south of Mysore. Quite as characteristic and also as widely spread is the chousingha or four-horned antelope (*Tetraceros quadricornis*), while the blackbuck, or heran (*Antilope cervicapra*) is found in suitable situations throughout the country. On the other hand, the chinkara, or Indian gazelle, the ravine deer of sportsmen (*Gazella bennetti*), is restricted to the plains and low hills of the north-western and central districts. In the deer family the muntjac or barking deer (*Cervulus muntjac*) occurs in all wooded hills, even to a considerable elevation in the Himalaya; its place on the plains being taken by the hog-deer (*Cervus porcinus*). From Assam and the Himalaya to the Narbada and Godaveri the swamp-deer, or barasingha (*C. duvauceli*), may be looked for in suitable localities; while the noble sambar (*C. unicolor*) is found in almost every part of the country except the dry plains of the Punjab, Sind, and Rajputana. The beautiful Indian spotted deer or chital (*C. axis*), is likewise to be met with almost everywhere. The elegant Indian chevrotain (*Tragulius meminna*), commonly known as the mouse-deer, although it is not a deer at all, is found in the hill-forests of Southern India, extending northwards to Orissa, Chutia Nagpur, and the eastern Central Provinces, as well as in the



INDIA

1. Blackbuck or Indian Antelope. *Antelope cervicapra*.
2. Nilgai. *Boselaphus tragocamelus*.
3. Bharal. *Ovis nahura*.
4. Four-horned Antelope. *Tetracerus quadricornis*.

* * For Measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.

Western Ghats. Lastly, the Indian wild boar (*Sus cristatus*) is distributed throughout the country, although never shot by sportsmen in any district where it can



WILD BOAR FROM COOCH-BEHAR.

be speared on horseback. Scaly ant-eaters, or pangolins (*Manis*), the sole Asiatic representatives of the Edentata, although rarely seen, are widely distributed in India.

Of game-birds other than those referred to above as characteristic of the Himalayan districts, the following may be mentioned:—Foremost is the peacock (*Pavo cristatus*), which ranges throughout the country, but is held sacred by the Hindus, so that the sportsman, if he wish to avoid trouble, must be careful where he shoots it. From the outer Himalaya to the Godavari valley, and westward to Raipur and Mandla, the red jungle-fowl (*Gallus ferrugineus*) is common; but in Southern and Western India this species is replaced by the grey *G. sonnerati*, specially abundant in the Narbada valley. At the foot of the Himalaya in Oudh, as well as in many forest-districts south of the Indo-Gangetic plain, the sportsman will come across the red spur-fowl (*Galloperdix spadicea*); while south of

the Ganges and in Southern Bombay and Madras he will find the painted spur-fowl (*G. lunulata*). Common in Bengal, the blue-headed quail (*Excalfactoria chinensis*) occurs locally in many other districts ; while the typical quail (*Coturnix communis*) is a winter visitor all over the country, where the rain-quail (*C. coromandelica*) is a permanent resident. The two species of bush-quail (*Perdicula*) are peculiar to the peninsula, where two species of painted bush-quail (*Microperdix*) are also met with locally, the third inhabiting Assam and Manipur. Much better-known is the handsome black partridge, or francolin (*Francolinus vulgaris*), which affords excellent sport from a howda in the Ganges khadir. Its southern limits run from northern Khatiawar and the south of Cutch through Gwalior and Sambalpur to Orissa ; to the south of this line its place being taken by the painted partridge (*F. pictus*). The common grey partridge or francolin (*F. pondicerianus*) is widely distributed, although unknown in Lower Bengal and some other eastern districts, as well as in parts of Bombay. The three-toed quails (*Turnix*), one species of which is commonly known as the bustard-quail, while the others are termed button-quails, are likewise familiar Indian birds.

Although unknown in Bengal, Chutia Nagpur, and Behar, the great Indian bustard (*Eupodotis edwardsi*) frequents the open plains of most parts of the country ; but the hubara (*Hubara macqueeni*) is only a winter visitor to the north-western districts. Some of the most esteemed of Indian game-birds are the Bengal and the lesser florican (*Sypheotis bengalensis* and *aurita*). Apart from smaller species, ibises, spoon-bills, storks (especially the huge and ungainly "adjutant," which visits Bengal during the rains), wood-ibises, herons,

night-herons, egrets, or paddi-birds, and flamingoes, are among the most familiar of Indian birds ; but to mention any of them in detail is impossible for want of space. The same remark applies to the hosts of water-fowl which visit India in the cold season, and a few of which are resident. It must accordingly suffice to state that, inclusive of swans, geese, and mergansers, no less than thirty-eight species of this group are admitted by Dr. W. T. Blanford into the list of Indian birds. Besides ducks and geese, the plains of India are invaded every autumn by flights of snipe, most of which remain for the winter and afford excellent sport ; the marshes, or jhils, in the neighbourhood of Calcutta being famous for these birds. The species usually met with are the common snipe (*Gallinago caelestis*), the pintail (*G. stenura*), and the jack snipe (*G. gallinula*) ; the Himalayan solitary snipe (*G. solitaria*) occurring in the range from which it takes its name, but also found in Siberia, China, and Japan. The beautiful painted snipe (*Rostratula capensis*), which, from its slow flight, affords poor sport, is, on the other hand, a permanent resident in the plains. Woodcock, which breed in the Himalaya, migrate in winter to the hills of Southern India, and during their journey may be met with in the plains. In the season woodcock-shooting is one of the principal sports of the Nilgiris. Excellent snipe-shooting may also be obtained during the winter on these hills ; and as the sportsman is travelling to or from his ground, he may pick up a stray spur-fowl, or a painted quail. Indian birds can scarcely be dismissed without mention of the beautiful purple water-hens (*Porphyrio*), which form such conspicuous objects around every lake and pool, where coots also swarm.

For those who care for reptiles, the Indian rivers offer a selection of crocodiles ; since, in addition to a couple of species of ordinary short-nosed magars, or typical crocodiles (*Crocodylus*), often miscalled alligators, the Ganges and certain other rivers are tenanted by the long-nosed garial (*Garialis gangeticus*), which, although generally feeding on fish, occasionally devours human bodies. The Gangetic dolphin (*Platanista gangetica*), locally known as susu, is likewise a characteristic denizen of the mighty river from which it takes its first name.

Among reptiles other than crocodiles, it must suffice to refer to the cobra (*Naia tripudians*), the king cobra (*N. bungarus*), Russell's viper (*Vipera russelli*), the craït (*Bungarus cœruleus*), and the giant monitor lizard (*Varanus salvator*).

CEYLON.—The fauna of Ceylon is essentially a poor edition of that of Southern India, many of the larger Indian animals—notably the tiger—being absent. Among the species indigenous to the island, the Indian elephant, although less numerous than formerly, is abundant in the hill-forests ; but unfortunately the Sinhalese race has almost always only rudimentary tusks. Wild buffalo are numerous in the northern and eastern districts, but gaur are absent. Sambar, miscalled elk by sportsmen, abound in the mountains, as do chital and muntjac in the forests of the interior. The sloth-bear and the leopard are the largest Sinhalese Carnivora, black specimens of the latter being occasionally seen. Langurs inhabit the lowland forests, and the toque macaque (*Macacus pileatus*), though nearly allied to the bonnet macaque of southern India, is peculiar to the island. Game-birds are not numerous ; the peacock inhabits the whole island, as does the

Ceylon jungle-fowl (*Gallus lafayetti*), but the Sinhalese spur-fowl (*Galloperdix bicalcarata*), which is likewise restricted to the island, is absent from the dry northern districts. Neither of the two Indian species of quail (*Coturnix*) occurs, but the jungle bush-quail (*Perdícula asiatica*) visits the northern districts. Himalayan types of game-birds are of course absent.

BURMA, SIAM, AND THE MALAY PENINSULA.—Under this heading are included the countries of the Asiatic mainland lying to the south-east of Assam and the south of China; Munipur and Tenasserim, as well as Anam and Tonkin, consequently coming within the area. Those portions of this tropical or sub-tropical tract which belong to or are under the influence of the British Government are more or less easy of access, but Tonkin and Anam are very difficult for the English sportsman. Although intimately connected with the fauna of India by that of Assam, a large number of the Burmese and Malay animals are restricted to the countries east of the Bay of Bengal, the Malay element increasing to the southwards.¹

Gibbons (*Hylobates*) as well as langurs and macaques, represent the monkey tribe throughout the area. Of the larger Carnivora, the tiger and leopard are likewise universally present, while the clouded leopard is a characteristic species. There are also several smaller cats, especially the beautiful bay cat (*Felis temmincki*), as well as civets (*Viverra*), palm-civets (*Paradoxurus*), and mongooses (*Herpestes*). The Burmese linsang (*Linsanga maculosa*) is peculiar to these countries, as is practically the small-toothed palm-civet (*Arctogale*

¹ For the big game of the Malay States see T. H. Hubback, *Elephant and Seladang Shooting in the Federated Malay States*. London: Rowland Ward, Ltd.

leucotis); while the binturong occurs throughout. Hyænas, wolves, and foxes are unknown, but jackals and the Malay wild dog (*Canis rutilans*) abound. Very characteristic are the small ferret-badgers (*Helictis*); and among the *Ursidæ* the Himalayan black bear extends as far south as Pegu, where it comes well within the range of the typical race of the Malay bear (*Ursus malayanus*). Of the insect-eating mammals, tree-shrews (*Tupaia*) are abundant, and the rat-shrew (*Gymnura rafflesi*), an animal something like a large long-nosed rat, extends as far north as Tenasserim. One hare (*Lepus peguensis*) is found in Burma; and throughout the region the burrowing bamboo-rats (*Rhizomys*) are common, as are also the brightly coloured giant squirrels (*Ratufa*), which are, however, common to India. On the other hand, the beautiful *Rhithrosciurus* is exclusively a Burmese and Malay type. Brush-tailed porcupines (*Atherura*) are also distinctive of the area.

The Indian elephant ranges through most of the forests of the countries under consideration; and much the same may be said with regard to the Javan and the Sumatran rhinoceros. The Javan species is, however, much less common than the Sumatran; the latter being represented in the Malay Peninsula by a small black race (*Rhinoceros sumatrensis niger*). In addition to these two, there appears to be a larger rhinoceros in the Singpho district of Upper Burma, which may be related to the great Indian species, but seems to be two-horned. A specimen is much wanted. There are no wild horses or wild asses in the area; but a characteristic mammal is the Malay tapir (*Tapirus indicus*), which ranges from the Malay Peninsula as far north as Tenasserim. This, however,

is an animal which, on account of the lack of horns, does not appeal to the ordinary sportsman.

Malaya abounds in wild cattle; the gaur, known to the Malays as the seladang, inhabiting all the forest hill-tracts; the Burmese race (*Bos gaurus readei*) is nearly black, with a tuft of long hair on the dewlap, while the Malay *B. g. hubbacki* frequently approximates in the form of the skull to the gayal. Although the latter occurs wild in Tenasserim, it is almost certainly nothing more than a domesticated breed of the gaur which has run wild. The characteristic wild ox of the Malay countries is, however, the bantén or tsaine; the Burmese tsaine (*B. sondaicus birmanicus*) being tawny coloured. In Siam some tsaine are flecked with white, and for this race the name *B. s. porteri* has been proposed. Buffaloes also occur, but whether these are truly wild, is uncertain. In the Arakan range the ashy goral of Sze-chuen is represented by a local race (*Urotragus griseus evansi*); and a red race of serow (*Nemorhædus sumatrensis rubidus*) occurs in Arakan and near Thyetmyo, and a black one (*N. s. swettenhami*) in the Malay Peninsula.

Of the deer tribe the area under consideration contains several peculiar forms. The most interesting of these is Schomburgk's deer (*Cervus schomburgki*) of Siam, at present represented in English collections only by the skull and by the antlers. The thamin, or Eld's deer (*C. eldi*), is another exclusively Malay type, extending southwards from Manipur; while the Malay sambar (*C. unicolor equinus*) is found as far north as Assam and Kachar. The hog-deer (*C. porcinus*) ranges throughout Burma, but is represented by an allied form, *C. p. hecki*, in Siam. The Indian muntjac, in the form of a local race, likewise ranges through Burma;

and the rare Tenasserim muntjac (*Cervulus fœæ*) has been obtained in the district from which it takes its name. Chevrotains of two well-defined species (*Tragulus javanicus* and *napu*) inhabit the Malay Peninsula. The Indian wild boar extends into Burma.

Among game-birds, peacocks are represented by the Burmese *Pavo muticus*; the Argus pheasant (*Argusianus argus*) is met with in Tenasserim, Siam, and the Malay Peninsula, while the rare Rheinhard's Argus (*Rheinardius ocellatus*) is a native of the mountain-forests of Tonkin. Two species of peacock-pheasants, the miscalled Argus of sportsmen, are also found, one (*Polyplectrum bicalcaratum*) being peculiar to the southern provinces of the area. While these birds will rise to the gun, the Argus, which is extremely wary, runs and skulks among the trees, so that it is generally captured by snaring. Three species of the beautiful fire-backed pheasants are found, although only one of these (*Lophura rufa*) ranges into Burma. The red jungle-fowl is common everywhere; and the kalij group is represented by the Burmese silver pheasant (*Gennæus lineatus*) in Burma and north-western Siam, and by Anderson's silver pheasant (*G. andersoni*) in Yun-nan. Bamboo-partridges (*Bambusicola*) and wood-quails (*Rollulus* and *Excalfatoria*) are included among the smaller game-birds; and the quail is a rare visitor, and the rain-quail a resident. Bush-quails (*Microperdix*) and hill-partridges (*Arboricola*), as well as species of the allied genera *Tropicoperdix* and *Caloperdix*, may likewise be found amongst a "mixed bag." Francolins (*Francolinus*) are less abundant than in India, but button-quail are numerous, one species (*Turnix blanfordi*) being almost restricted to the area. Snipe and water-fowl of various kinds are to be met with in large numbers

during the cold season. Of other groups it must suffice to mention that the beautiful eastern trogons (*Harpactes*) may be sought in the densest woods, and that specimens of the rain-bird (*Cymborhynchus*), a member of the family of broad-bills, or *Eurylæmidæ*, and barbets (family *Capitonidæ*) should be preserved when obtained. Hornbills (*Buccrotidæ*) are likewise abundant in the area, as are also the gorgeous pittas or ant-thrushes (family *Pittidæ*). In the Philippines the monkey-eating eagle represents a peculiar generic type (*Pithecophaga*).

The Malay Peninsula, together with Borneo, is the home of Schlegel's gharial (*Tomistoma schlegeli*), a species generically distinct from the Indian gharial, and, like the latter, the only living representative of its kind. The Malay python (*Python reticulatus*) is one of the biggest of all snakes. Terrapins of various kinds and likewise tortoises (*Trionyx* and *Emyda*) abound in the Malay rivers, as they do in those of India. The Burmese *Testudo platynota* marks the eastern limit of the true land-tortoises.

ISLANDS OF THE MALAY ARCHIPELAGO.—Although but seldom visited by British sportsmen, the great islands of the Malay Archipelago contain a fauna nearly related to that of the Malay Peninsula, but including a certain number of peculiar types, although to the eastward gradually approximating to that of New Guinea and Australia. Since few persons grasp the real size of many of these islands, it may be mentioned that Borneo is more than double the area of Great Britain, while Sumatra is as large as the entire home empire, and Java as extensive as Ireland. In these three islands many of the mammals and birds are specifically identical with those inhabiting the main-

land. Among such may be mentioned the elephant (unknown in Java), the two smaller species of Asiatic rhinoceros, the tiger and leopard, and in Sumatra, the Malay tapir. Other Carnivora are the clouded leopard, the flat-headed cat (*Felis planiceps*), the bay cat (*Felis temmincki*), and the Malay bear. Quite peculiar is the small water-civet (*Cynogale bennetti*). Still more striking among the animals of these islands are the orang-utan, or mias (*Simia satyrus*), which is confined to Sumatra and Borneo, the grotesque-looking proboscis monkey (*Nasalis larvatus*), of the island last named, and the siaman (*Hylobates syndactylus*), which is common to Sumatra and the Malay Peninsula. The typical race of the bantin (*Bos sondaicus*), in which old bulls are black, appears to inhabit all three islands; and there are many peculiar deer in these and the smaller islands. Among the latter the Burmese sambar is met with in Borneo, and may also occur in Sumatra; the Luzon sambar (*C. unicolor philippinus*) is a smaller race from Luzon, in the Philippine group, while the still smaller Basilan sambar (*C. unicolor nigricans*) inhabits the island of that name in the same group. A characteristic species is the rusa deer (*C. hippelaphus*) of Java, races of which also inhabit the Moluccas and Timor. The spotted Philippine deer (*C. alfredi*) and the Calamianes deer (*C. culonensis*) are peculiar to the Philippine group; while the little Bavian deer (*C. kuhli*) takes its name from certain small islands lying between Borneo and Java. Muntjacs are common in the islands just mentioned as well as in Sumatra, one of them being specifically inseparable from the Indian species. Chevrotains are likewise numerous. Borneo possesses a dwarf race of the Indian buffalo (*Bos buvalis hosei*) which appears to be a truly

wild animal. Wild pigs are found in most, if not all of the islands of the archipelago, and are all more or less distinct from the Indian species; among them being *Sus verrucosus* and *S. vittatus*, and the long-snouted *S. barbatus* of Borneo, closely allied to which is the Sumátran *S. oi*. Among smaller mammals attention may be directed to the numerous tree-shrews (*Tupaia*) and squirrels, some of the latter being remarkable for their brilliant coloration. Four species, or races, of the large-eyed, hopping little lemur-like tarsier (*Tarsius*) are found in the three great western islands, as well as in the Malay Peninsula, the Philippines, and Celebes; and the flying-lemurs (*Galeopithecus*), which are some of the most remarkable of all Malay mammals, have a very similar distribution. Pangolins range as far east as Celebes.

The birds are of the same general type as those of the Malay Peninsula, although they include many peculiar species. In the mountains of western Sumatra occurs the black fire-backed pheasant (*Acomus inornatus*); while the lesser Argus (*Argusianus grayi*) is peculiar to Borneo, where also occurs the gorgeous Bulwer's pheasant (*Lobiophasis bulweri*), conspicuous for its blue wattles, as well as the rare Schleiermacher's peacock-pheasant (*Polyplectrum schleiermacheri*). In Java, which is specially notable for the beauty of its birds and insects, reappears the Burmese peacock, unknown in the other islands, and likewise the Nicobar pigeon (*Caloenas nicobarica*), conspicuous for the long bronzy hackles of the neck, whose range extends from the Nicobar Islands, in the Bay of Bengal, to New Guinea and the Bismark Archipelago. The red jungle-fowl and the green jungle-fowl (*Gallus varius*) are also found in Java. Among other remarkable or brilliantly

plumaged birds may be mentioned a fine hornbill (*Buceros sylvestris*); the yellow-and-green trogon (*Haplarpactes reinwardti*) of Java, represented by an allied species in Sumatra; a superbly coloured fly-catcher (*Pericrotus miniatus*); and the black-and-crimson oriole (*Oriolus cruentus*). The best time to visit Java is during the dry season, lasting from April till September.

Since mention has already been made of the deer of the islands of the Philippine group, it will suffice to add that Mindoro is the habitat of a small buffalo (*Bos mindorensis*) locally known as the tamarao. Huge hairy rats (*Phlæomys*) are likewise found in the Philippines; and reference may be made to the existence of a peculiar fauna of rat-like rodents in the mountains of Luzon, some of which exhibit affinities with the *Muridæ* of Australia.

The peculiarly-shaped island of Celebes stands apart from those already mentioned by the strongly-marked Australian character of its fauna, although its Indo-Malay relationship is exhibited by the presence of the dwarf buffalo or anoa (*Bos depressicornis*), the smallest of the wild cattle, and of the babirusa (*Babirusa celebensis*), a peculiar type of the swine family, represented by a second species †(*B. alfurus*) ‡in the neighbouring island of Boru. Celebes also possesses a nearly tailless black baboon (*Cynopithecus niger*), representing a genus by itself, as well as a macaque (*Macacus maurus*), while, as already mentioned, it is likewise inhabited by a tarsier and a flying-lemur. A civet and a palm-civet also occur. On the other hand, the presence of cuscuses (*Phalanger*) gives an Australian cast to the fauna of the island, which is intensified by the existence of a cassowary in Ceram, and of a bird-of-paradise in Gilolo and Batjan.

NEW GUINEA AND AUSTRALIA.—Papua and Australia, together with the neighbouring islands, possess an assemblage of animals totally distinct from those of all the rest of the world, although, as indicated above, a few of the characteristic types are common to the more eastern islands of the Malay Archipelago. Among the most striking denizens of this area are the gorgeous birds-of-paradise, represented by some fifty species chiefly inhabiting New Guinea and the Papuan islands, especially the Aru group; one genus, however, is found in the Moluccas, while three occur in northern Australia. Mention may be made of the twelve-wired bird-of-paradise (*Seleucides nigricans*) from Salwatti and north-west New Guinea, the scale-breasted species (*Ptilorhis magnifica*), and the gorget bird-of-paradise (*Astrapia nigra*), both the latter being from New Guinea, where the last is confined to the mountains of the interior. The wattled *Paradigalla bicarunculata*, with its conspicuous orange and azure wattles, is likewise Papuan, but the typical, or great bird-of-paradise (*Paradisea apoda*), is from the Aru Islands. Not less notable are the king paradise-bird (*Cicinparus regius*) of New Guinea, Wilson's bird-of-paradise (*Diphyllodes*, or *Schlegelia wilsoni*) from Waigiou and Batanta, the six-plumed *Parotia sexpennis* of New Guinea, and the standard-wing (*Semioptera wallacei*) from Batjan and Gilolo. The bower-birds, taking their name from their habit of forming decorated "runs," are an exclusively Australasian type, the majority being restricted to Australia itself, although a few are found in the smaller Papuan islands, while the gardener-birds (*Amblyornis*) are confined to New Guinea. The three species of lyre-bird (*Menura*) are restricted to Australia. Paraquets and lories

(*Lorius*) are abundant throughout the region, some of the latter being noticeable on account of their gorgeous colours. Cockatoos (*Cacatuidæ*) are likewise characteristic of the Australasian region, ranging, however, as far west as Celebes, Lombok, and the Philippines, and eastwards not extending farther than the Solomon group. Although found in many of the other Pacific islands, and represented by a single outlying species in the Nicobars, the family of the megapodes and brush-turkeys (*Megapodiidæ*) is chiefly Australasian. The typical brush-turkeys (*Talegallus*), for example, are confined to New Guinea, and some of the smaller Papuan islands, while the Australian brush-turkey (*Catheturus lathami*) is restricted to Australia. The most important of all Australasian birds are perhaps cassowaries and emus (*Casuariidæ*); the former (*Casuarus*) inhabiting Australia, New Guinea, Ceram, and some of the neighbouring islands, and the latter (*Dromæus*) not ranging beyond Australia, Tasmania, and the islands in Bass Strait. Among other birds may be mentioned the great Australian bustard (*Choriotis australis*), the laughing kingfisher (*Dacelo gigas*), the slaty-blue crowned pigeons (*Goura*) of Australia and the Papuan islands, and the so-called piping crows (*Gymnorhina*) of Australia and Tasmania. The black swan (*Cygnus atratus*) and the Cape Barron goose (*Cereopsis novæ-hollandiæ*) are also of special interest.

Even more peculiar than the birds are the mammals of Australasia, the chief features being the abundance of marsupials, and the presence of the only living representatives of the egg-laying monotrema. As in the case of the birds, some of the Australasian types of mammals extend as far westwards as Celebes. Besides these pouched and egg-laying mammals, the other

members of the class found in the area are flying-foxes, smaller bats, and various rats, among which it will suffice to mention the golden-bellied water-rat (*Hydromys chrysogaster*). New Guinea has indeed a wild pig, but this appears to have been introduced.

New Guinea is remarkable for the number of its tree-kangaroos (*Dendrolagus*), as well as for its cuscuses (*Phalanger*), the beautiful striped phalangers (*Dromicia*), and several flying-phalangers or flying-opossums, some of the latter being scarcely larger than mice. Spiny ant-eaters (*Echidna*), some of which also occur in Australia, represent the egg-laying mammals in Papua, where the duck-bill, or platypus (*Ornithorhynchus paradoxus*), of Australia and Tasmania is unknown. The large kangaroos are likewise exclusively Australian. Foremost among these is the great grey kangaroo (*Macropus giganteus*), distributed all over Tasmania and the mainland except the extreme north, where it is replaced by the rare *M. antilopinus*. The great red kangaroo, or "red buck" (*M. rufus*), is found in the timbered districts of many parts of the interior, but more particularly New South Wales, where the smaller but equally handsome Parry's Wallaby (*M. parryi*) also abounds. On the other hand, the great black wallaroo (*M. robustus*) inhabits the mountain-ranges of the interior of New South Wales. Of Tasmanian carnivorous marsupials the largest is the thylacine, or Tasmanian wolf (*Thylacinus cynocephalus*), restricted to the mountains of the interior, where is found the still more savage Tasmanian devil (*Sarcophilus ursinus*). Wombats (*Phascolomys*) are common to Australia, Tasmania, and the islands of Bass Strait; but the arboreal koala or native bear (*Phascolarctus*) only frequents the eastern side of the mainland, from

Queensland to Victoria. Of smaller marsupials mention may be made of the kangaroo-rats (*Bettongia*, *Aepyprymnus*, and *Hypsiprymnus*, or *Potorus*), the flying-phalangers (*Petaurus*), the phalangers, or Australian opossums (*Pseudochirus* and *Trichosurus*), the bandicoots (*Perameles*), and the dasyures, or native cats (*Dasyurus*). Special attention may be directed to two rare species, namely, the pig-footed bandicoot (*Chæropus castanotis*) and the banded ant-eater (*Myrmecobius fasciatus*) of the southern and western provinces of the mainland. Interesting, too, is the little marsupial mole (*Notoryctes typhlops*) from the sandy deserts of the interior of South Australia. Last of all comes the Australian wild dog, or dingo (*Canis dingo*), which was almost certainly introduced by the natives.

It may be added that the Indian buffalo has been introduced into the northern territories of South Australia, where it has run wild, and is hunted for the sake of its hide.

As regards New Zealand, it is almost unnecessary to mention that there are no indigenous mammals, except a couple of bats, although red deer, as well as certain other large ruminants, have been introduced. These New Zealand red deer grow to an unusually large size, and afford excellent sport. Among many notable birds, the most peculiar are the wingless kiwis (*Apteryx*); but the greatest rarity is the large Mantell's coot (*Notornis mantelli*), of which a living specimen was obtained in 1898, but which may now be extinct. In addition to many aquatic species, pigeons and parrots of various descriptions are abundant, among the latter being the three peculiar types respectively known as the kea and kaka (*Nestor*) and the owl-parrot (*Stringops*).

The tuatera (*Sphenodon punctatus*), a lizard-like New Zealand reptile, demands special notice as the sole surviving representative of the order Rhynchocephalia.

The mention of pigeons serves to recall the fact that Samoa is the home of the saw-billed *Didunculus strigirostris*, a rare and peculiar species which appears to be the nearest living relative of the extinct dodo of Mauritius.

The river-tortoises of Australasia are totally distinct from those of Asia, belonging to the southern group (Pleurodira), which bend their necks sideways, instead of retracting them in an S-like flexure after the fashion of the northern type (Cryptodira). The most deadly snake is the death-adder (*Acanthophis antarctica*), ranging from South Australia to the Moluccas.

Lastly, it has to be mentioned that the rivers of Queensland contain a survivor of an extinct family of lung-fishes (*Ceratodontidæ*) in the shape of *Neoceratodus forsteri*, locally known as the Burnett salmon. The other living members of the group, representing a second family, are, as mentioned under the headings of those countries, respectively confined to tropical Africa and South America.

NORTHERN AFRICA.—That portion of Africa which lies, roughly speaking, to the north of the tropic of Cancer, and includes Morocco, Algeria, Tunisia, Tripoli, and lower Egypt, together with the northern districts of the Sahara, is so different zoologically from the rest of the continent of which it forms a part, that it is best treated separately. In this respect it is indeed much more intimately related to Europe and Asia than it is to the rest of Africa; and it was connected at a comparatively recent epoch with Spain and other districts of southern Europe. A certain number of

types characteristic of the more southern countries of Africa are, however, found to the north of the Sahara, and thus cause some mixture of distinctive African types with the northern fauna; and in past epochs North Africa seems to have had a fauna of the same general type as that of the rest of the continent.

Some of the animals inhabiting North Africa, such as the lion, the leopard, and the hunting-leopard, may be regarded in the light of cosmopolitan species, so far as the greater part of the Old World is concerned, being common to many parts of Asia and the whole of Africa. The North African representatives of these form, however, in some cases local races; the leopard, for instance, being allied to the typical Indian race, while the lion is generally characterised by its deep yellowish brown coat and grand mane.

The Carnivora also include the southern lynx (*Felis pardina*), which is common to Spain, the caracal (*F. caracal*), whose range extends from the Cape to India, the typical form of the African wild cat (*F. ocreata*), and a race of the Indian jungle-cat (*F. chaus nilotica*). At one time, at any rate, a race of the brown bear (*Ursus arctus crowtheri*) inhabited the Atlas; this being the only representative of the group in the whole continent. Asiatic affinities are also indicated by the presence of the striped hyæna, which extends, however, into East Africa. Wolves, foxes, and jackals of a European or Asiatic type are likewise met with, although mingled with these in the desert districts is a small fennec fox. The Barbary ape (*Macacus inuus*), also found on the rock of Gibraltar, is essentially an Asiatic, as opposed to an African type of monkey. On the other hand, baboons (*Papio*) indicate African and Arabian resemblances. Genets and mongooses also

occur ; the typical genet (*Genetta vulgaris*) being likewise met with in Spain. Another characteristically European type is the Barbary red deer (*Cervus elaphus barbarus*), and the fallow deer (*C. dama*) is also stated to exist in the neighbourhood of Constantine, although not apparently in a truly wild state ; these two species alone representing the deer tribe in Africa. Similarly the European wild boar, which is common in Morocco and Algeria, and another pig (*Sus sennarensis*) from Sennar are the sole African members of the genus *Sus*. Unlike the rest of Africa, antelopes are few, two of them being the bubal hartebeest (*Bubalis boselaphus*) and the addax (*Addax nasomaculatus*). The white oryx (*Oryx leucoryx*) ranges from the Sahara into the southern parts of the area under consideration, and in the mohr (*Gazella dama mohr*) Morocco possesses a local race of the swift gazelle of Senegambia. Other antelopes are the dorcas gazelle (*G. dorcas*), common to Syria and Arabia, the edmi or mountain gazelle (*G. cuvieri*), Hay's gazelle (*G. hayi*), and the straight-horned rim or loder's gazelle (*G. leptoceros*). The great prize among the horned game is, however, the udad or arui (*Ovis lervia*), found in suitable localities from the Atlas to Egypt and the Sudan, and very different from other wild sheep, of which it is the sole African representative.

Lower Egypt is the home of the beden or Nubian ibex (*Capra nubiana*), which apparently also occurs in the Atlas range of Morocco, as it certainly does in the Mokatam Mountains bordering the Red Sea, whence it extends into Syria and Arabia. A finer goat is the wala or Abyssinian ibex (*C. vali*), an outlying member of the European fauna which inhabits the mountains of the Simien district of Abyssinia.

Hares, including the Algerian *Lepus kabylicus* and *L. pallidior*, the Tunisian *L. tunetæ*, and the Moroccan *L. schlumbergeri*, are more or less abundant throughout Northern Africa.

Of game-birds, the Barbary partridge (*Caccabis petrosa*) is peculiar to North-western Africa, Sardinia, the neighbourhood of Gibraltar, and some of the Canary Islands. The common francolin seems once to have occurred, but is now exterminated; but quail are abundant, as are likewise sand-grouse (locally known as kangar), snipe, the bustard, and the lesser bustard. Among other birds may be mentioned the golden, tawny, and Bonelli's eagle, the lammergeier, ger-falcon, buzzard, harrier, kestrel, sparrow-hawk, crane, raven, cuckoo, hoopoe, ortolan, jay, pewit, little plover, goldfinch, desert-finch, desert-lark, lark, greenfinch, Algerian chaffinch, willow-wren, swallow, swift, marten, sparrow, and various titmice.

AFRICA SOUTH OF THE NORTHERN TROPIC.—The vast hunting-grounds of that portion of Africa situated to the south of the tropic of Cancer may be conveniently considered by commencing at the southern extremity and gradually working northwards. Before doing so a short space may be devoted to a few of the peculiarities of the typical African fauna as a whole; that is to say, to the fauna of the area to the south of the above-mentioned line, which alone exhibits these peculiarities. In this connection it is important to mention that Ethiopian Africa, as the area in question is termed by naturalists, is by no means inhabited all over its extent by the same animals. Quite the contrary; and, as a matter of fact, this portion of the continent may be divided into three well-defined divisions, distinguished not only by physical conditions, but likewise by the

animals which inhabit them. The first of these divisions is known as the East Central tract, and includes the southern and eastern portions of the continent, together with those portions of the central districts which do not lie within the forest tract. It is true that the portion of the continent situated to the south of the tropic of Capricorn differs markedly in its physical conformation and its vegetable products, and to a certain extent also in regard to its animals, from the districts farther north, but this difference is not sufficiently pronounced to justify its separation from the remainder of the tract. Much the same remarks are applicable in the case of Somaliland. The second tract is formed by the forest-zone, which, although occurring in its typical form in the neighbourhood of the West Coast, extends right across the continent as far east as the Semliki valley in Uganda. The third, or Saharan, or desert tract, forms a belt of from four to ten degrees in depth stretching across the continent to the northward of the other areas, and containing a comparatively limited fauna, which passes by almost insensible gradations into that of North Africa.

As a whole, the fauna of Ethiopian Africa is characterised not only by the presence of a number of peculiar types of mammals and birds, but is almost equally well distinguished by the absence of several groups which are elsewhere numerous. Among these absent forms, deer, sheep, and bears are the most conspicuous, while, with the exception of the Nubian and Abyssinian species of ibex, goats are likewise wanting. There are no tapirs, and the pigs are of a different type from those of other parts of the world, although a single species of the typical group occurs in the mountains of Sennar. Among smaller mammals, moles, tupais,

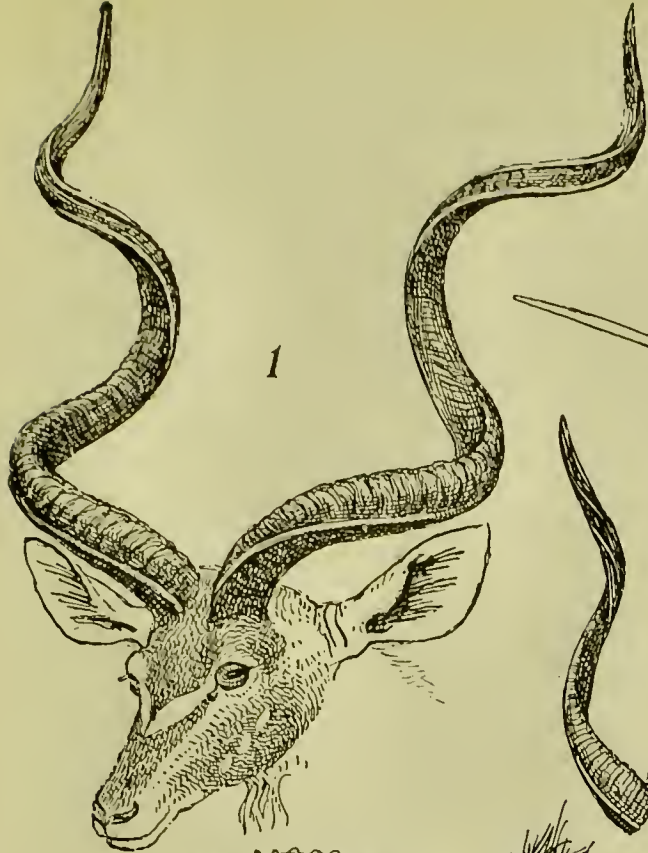
marmots, susliks, chipmunks, water-rats and short-tailed field-mice (voles), beavers, and picas are likewise lacking, while pheasants, partridges, peafowl, and the grouse tribe are unrepresented among birds.

Among the most striking of exclusively African animals may be mentioned the gorilla and chimpanzee (both confined to the forest-zone), monkeys of the genera *Cercopithecus*, *Colobus*, and *Cercocebus*, and gelada baboons (*Theropithecus*) and dog-faced baboons (*Papio*), although the last are represented in Arabia. Pottos (*Perodicticus*) represent the Asiatic lorises in the forest-zone, and the galagos (*Galago*) are an African group of lemurs. The lion, the largest of African Carnivora, is also found in North Africa and parts of South-western Asia, but the spotted and the brown hyæna (*Hycæna crocuta* and *H. fusca*), the hunting-dog (*Lycaon pictus*), and the aard-wolf (*Proteles cristatus*) are absolutely distinctive of Ethiopian Africa. The African elephant is a very different animal from its Asiatic relative, and the African rhinoceroses are still more distinct from their representatives in Asia. Hippopotamuses, wart-hogs (*Phacochærus*), the forest-hog (*Hylochærus*), bush-pigs (*Potamochoærus*), and the ant-bear or aard-vark (*Orycteropus*) occupy a prominent position among the characteristic animals of the African continent; while giraffes and the okapi (family *Giraffidæ*) are some of the most striking of Ethiopian animals. Very remarkable is the extraordinary development of antelopes of various descriptions (ranging in size from the eland to the diminutive dik-diks and the pigmy antelopes), which occur in all parts of the continent, although most abundant on the open plains of the south and east. Excepting the few African forms which inhabit the districts north of the Sahara or

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1. Kudu. *Strepsuceros capensis*.
2. Beisa. *Oryx beisa*.
3. Situtunga Antelope. *Tragelaphus spekei*.
4. Sable Antelope. *Hippotragus niger*. (Scalp as saved on the field.)
5. Roan Antelope. *Hippotragus equinus*.
6. Eland. *Taurotragus oryx*.

* * * For Measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.



Arabia, and exclusive of gazelles, the saiga, chiru, and the blackbuck, four-horned antelope, and nilgai, typical antelopes are wanting in other parts of the world, whereas in Ethiopian Africa there are fully a hundred species and races. Eland (*Taurotragus*), the bongo (*Boöcercus*), kudu (*Strepsiceros*), the bush-buck group (*Tragelaphus*), wildebeest, or gnu (*Connorchætes*), hartebeests (*Bubalis*), the korrigum, tsessebe, and blesbok (*Damaliscus*), duikers (*Cephalophus*), waterbuck and kobs (*Cobus*), reedbuck (*Cervicapra*), pala (*Æpyceros*), oryx, sable and roan antelope (*Hippotragus*), may be mentioned as a few of the groups of larger antelopes characteristic of Ethiopian Africa. Equally distinctive are the various species of zebra, the bonte-quagga and the true quagga, while the wild asses of north-eastern Africa are very different from their Asiatic cousins. The little hyraxes (*Hyrax* or *Procavia*) form a subordinal group of ungulates exclusively African, with the exception of a single outlying Syrian representative; some of the species having burrowing habits, while others are arboreal. Except for the so-called Abyssinian wolf, or cuberow (*Canis simensis*), which is in some respects fox-like, there are no wolves, but jackals are abundant, in addition to which are fennecs (*C. zerda*, etc.), and the big-eared fox (*Otocyon megalotis*), both exclusively African. The hunting-leopard, ratels (*Mellivora*), and pangolius are common to Africa and India. Small mammals peculiar to the continent are far too numerous to mention in detail, but reference must be made to the scaly-tailed squirrels (*Anomaluridæ*) of the forest districts, which form a unique group; some having the habits of flying-squirrels, while one is more like an ordinary squirrel. The golden moles (*Chrysochloridæ*) are a South and East African

type, the otter-shrew (*Potamogale*), likewise representing a family by itself, is characteristic of the forest-zone, while the jumping-shrews (*Macroscelididæ*) replace in the south and east the tupais or tree-shrews of Asia. The great sand-mole of the Cape is the typical representative of an African family (*Bathyergidæ*) of rodents.

Many types of birds are peculiar to Africa, but limits of space prevent reference to more than a few. Ostriches (*Struthio*) claim the first place as characteristic African birds, although they also range into Arabia; but the secretary-bird (*Serpentarius*) and guinea-fowls (*Numididæ*) are solely African. Numerous species of francolins, and spurred partridges (*Francolinus* and *Pternistes*) are likewise characteristic of the country, as are sand-grouse. Mention may also be made of the ground-hornbills (*Bucorax* or *Bucorvus*) and of ox-peckers or rhinoceros-birds (*Buphaga*) as exclusively African types; and also of the metallic green birds known as ground-hoopoes, which form the African family *Irrisoridæ*. There is a great development of whydah and weaver-birds (*Ploceinæ*), of which the other members are Indian. Bustards of the genus *Eupodotis* are common to Africa, Arabia, India, and Australia, but there are several nearly related genera which are solely African. Africa shares pythons and cobras with Southern Asia, but the dreaded puff-adders (*Bitis*) are peculiar to the former continent, as is also the ringhals (*Sepedon*), an aberrant form of cobra. Land-tortoises with a star-like pattern of yellow lines, as typified by *Testudo geometrica*, abound in the southern districts; and *T. calcarata* is noteworthy, on account of approaching in size the giant tortoises of the islands of the Indian Ocean. *Cyclanorbis* and

Cycloderma are peculiar African types of soft river-tortoises. Crocodiles abound, but there are no gharials. Among lizards, monitors (*Varanus*) and spiny-tails (*Uromastix*) are common to Africa and Southern Asia.

SOUTHERN AFRICA.—Including under this heading the vast extent of country lying between the Cape and a line connecting the mouth of the Zambesi on the east to Walfisch Bay on the west, it will be necessary to divide the area as a hunting-field into several districts.

Cape Colony having been longer under European settlement than any other part of South Africa, its big animals have been to a great extent exterminated; some indeed, like the blaauwbok (*Hippotragus leucophæus*), and the true quagga (*Equus quagga*) having become extinct. Of those that remain, the Cape bushbuck (*Tragelaphus scriptus sylvaticus*), the duikerbok (*Cephalophus grimmi*), the blue duiker (*C. monticola*), locally known as bluebuck, the grysbok (*Rhaphiceros melanotis*), the leopard, the hunting-dog (*Lycaon pictus*), the bush-pig (*Potamochoerus chæropotamus*), the Cape buffalo (*Bos caffer*), and the elephant (*Elephas africanus*) are found in the coast districts. The last two are under Government protection, but permission is obtainable to shoot one or two of each. Farther inland are found the vaal rhebok (*Pelea capreolus*), the red or rooi rhebok (*Cervicapra fulvorufula*), the klipspringer (*Oreotragus saltator*), the steinbok (*Rhaphiceros campestris*), and the springbuck (*Antidorcas euchore*). Bontebok (*Damaliscus pygargus*) remain on Mr. Van-der-Byl's farm, near Swellendam, and white-tailed gnu, or black wildebeest (*Connochætes gnu*), on a farm in Victoria West. The true or mountain zebra (*Equus zebra*) is preserved in some of the mountain-

ranges of the Colony ; where may still be found a few kudu (*Strepsiceros capensis*). The spotted hyæna (*H. crocuta*) is occasionally to be met with ; but the brown *H. fusca* is scarce.

In Natal the sportsman may obtain the Cape bushbuck, the reedbuck (*Cervicapra arundinum*), together with steinbok, oribi (*Oribia scoparia*), the Natal duiker or redbuck (*Cephalophus natalensis*), the duiker-bok, the blue duiker, the vaal and the red rhebok, and klipspringer. Bush-pigs and leopards are of course to be found.

In Zululand some years ago buffaloes were to be met with in troops of from twenty to thirty, and rarely numbering from sixty to one hundred. Blue wildebeest (*Connochætes taurinus*) occurred in troops of fifty to one hundred, waterbuck (*Cobus ellipsiprymnus*) in parties of six to fifteen, while kudu ranged all over the country. Black rhinoceroses (*Rhinoceros bicornis*) were abundant in suitable country, and between the fork of the Black and White Umvolosi Rivers a few white rhinoceros (*R. simus*) still survived under Government protection. Hippopotamuses peopled the lakes and so-called " pans " ; and a race of the bonte-quagga, or Burchell's zebra (*Equus burchelli*) was fairly plentiful on the flats by the Umsinduri River. Bush-pigs, or boschvarks, were common, and wart-hogs (*Phacochoerus africanus*) met with occasionally. Reedbuck, bushbuck, red rhebok, pala (*Æpyceros melampus*), Nyala (*Tragelaphus angasi*)—on the lake-flats—the Natal and Cape duikers, steinbok, and klipspringers occurred in large numbers ; reedbuck being specially numerous.

As it has been mentioned that the birds properly so-called are unknown in Africa, the sportsman may be puzzled by the frequent occurrence of the word

“pheasant” in lists of African game, this being due to the fact that all the tree-roosting francolins are termed *phaysaants* by the Dutch, who also call the ground-roosting francolins and sand-grouse *patraise* (partridge). Here will be a convenient place for a few words in regard to the game and other large birds of Southern Africa.

Among the francolins are the widely-spread coqui (*Francolinus coqui*), Smith's francolin (*F. sephaena*), the pearl-breasted or grey-winged *F. africanus*, Levailant's francolin (*F. levaillanti*), commonly known as the Cape redwing, and the Gariep, or Orange, River *F. gariensis*, as well as the Cape *F. capensis* and the Natal *F. natalensis*. Equally characteristic, although less numerous in species, are the bare-necked francolins, among which may be mentioned Swainson's *Pternistes swainsoni* and the Cape *P. nudicollis*; other kinds occurring to the north of the Zambesi, as well as in Angola and the neighbouring provinces. The quail is found in abundance in Cape Colony, the Transvaal, and Natal; the migrations usually commencing about August, but depending on the rainfall. On the other hand, the harlequin-quail (*Coturnix delegorguei*) is much less common. Button-quail (*Turnix hottentotta* and *lepurana*) are met with sparingly throughout Southern Africa, where two kinds of guinea-fowl (*Numida coronata* and *Guttera edouardi*) occur south of the Zambesi. Of sand-grouse there are three, namely, the double-banded (*Pterocles bicinctus*), the variegated (*P. variegatus*), and the yellow-throated (*Pteroclidurus namaquus*); the last being the *naacht patraise* of the Dutch. Southern Africa, as already mentioned, has numerous species of bustards, among which the kori (*Eupodotis cori*), the *ghaum-paauw* of the Boers, is

the largest, and now most abundant in the Transvaal and Bechuanaland. The Stanley bustard (*Neotis caffra*) is a member of an allied genus restricted to South and East Africa; and among the numerous kinds locally known as khurhaan, mention may be made of the blue bustard, or khurhaan (*Trachelotis cærulescens*), now most abundant on the flats of the Orange River Colony. The South African thick-knee, or dikkop (*Ædicnemus capensis*), and the Natal dikkop (*Æ. natalensis*) are likewise well-known birds of sport. Here also may be mentioned the southern crowned crane (*Balearica chrysopelargus*), the African marabou stork, or adjutant (*Leptoptilus crumenifer*), the greater South African flamingo (*Phænicopterus erythræus*), abundant in the neighbourhood of Walfisch Bay, the lesser flamingo (*P. minor*), the Stanley crane (*Tetrapteryx paradisea*), and the secretary-bird (*Serpentarius secretarius*).

South African water-fowl are numerous, and among them may be mentioned the spur-winged goose (*Plectropterus gambensis*), the Egyptian goose (*Chenalopex ægyptiaca*), which is the common wild goose of the Cape, the knob-billed duck (*Sarcidiornis africanus*), not found south of the Orange River, the Maccoa diving-duck (*Erismatura maccoa*), the masked duck (*Dendrocygna viduata*), common on the Zambesi and its tributaries, but rare farther south, the crimson-billed teal (*Pæcilonetta erythrorhyncha*), of the northern districts, the Cape teal (*Nettion capense*), the Hottentot teal (*N. punctatum*), and the yellow-billed teal (*Anas xanthorhyncha*), the commonest of all in Cape Colony, and the smallest of all Cape wild-fowl. The common snipe of the country is the black-quilled *Gallinago nigripennis*, but the great snipe (*G. major*) is also met

with. Lastly, the painted snipe (*Rostratula capensis*) is sparsely distributed over the country.

Reverting to big game, the open plains of the Orange River Colony and the Transvaal still maintain herds of blesbok (*Damaliscus albifrons*), springbuck, and brindled gnu, although in continually decreasing numbers, and in more circumscribed localities. A few of the smaller kinds of antelopes are likewise to be found in these territories, while in the northern and eastern districts of the Transvaal a small number of lions, giraffes, buffaloes, and certain of the larger antelopes are still to be found. The North Transvaal giraffe (*Giraffa camelopardalis wardi*) is a race apart from the southern *G. c. capensis*.

In Rhodesia and the other territories of the British South Africa Company lying to the north of the Transvaal, between the Limpopo and Zambesi, rinderpest some years ago caused great destruction to the horned game. Elephants, probably (*Elephas africanus knochen-haueri*), are scarce to what they were when the country was first opened up; but the black rhinoceros is still fairly common, and it is just possible that a few of the white species may survive in northern Matabililand and adjacent portions of Mashonaland. Hippopotamuses are plentiful in the Zambesi and its larger tributaries. Buffaloes are numerous along the Chobi, as well as on the tributaries of the Zambesi eastward of the Victoria Falls. There are likewise giraffes in N.E. Rhodesia; eland (*Taurotragus oryx*); gemsbok (*Oryx gazella*); sable antelope (*Hippotragus niger*); roan antelope (*H. equinus*); kudu; waterbuck; cama hartebeest (*Bubalis cama*), with a range very similar to that of the gemsbok; Lichtenstein's hartebeest (*B. lichtensteini*), found near the Sabi River in south-

eastern Mashonaland ; pala ; tsessebe (*Damaliscus lunatus*) ; lechwi (*Cobus leche*), common in the swamps of the Botlitli, Mababi, and Chobi rivers ; puku (*C. vardonii*) typically from a small area on the southern bank of the Chobi ; and situtunga (*Tragelaphus spekei*), in the swamps of the Mababi, Machabi, and Chobi. The antelopes likewise include blue wildebeest, reedbuck, oribi, duiker, inclusive of a race of the large yellow-backed *Cephalophus sylvicultor*, klipspringer, spotted bushbuck (*Tragelaphus scriptus typicus*), and grysbuck. Among other species a race of the bontequagga, bush-pigs, wart-hogs, leopards, hunting-leopards, spotted hyæna, hunting-dog, caracal, serval (*Felis serval*), civets (*Viverra civetta*), ratel, otters (*Lutra*), porcupines (*Hystrix*), and ant-bears ; the N.E. Rhodesian representative of the last being *Orycteropus afer wardi*. Jackals are of course abundant, and lions are to be found wherever there is game. Here it may be noted that lions are really, as well as apparently, scarce at the present day in most parts of South Africa, where they seem to be more completely nocturnal, and therefore less frequently seen than in North Africa.

Since the opening-up of South-east Africa by the Chartered Company, their territory has been connected with the east coast by railway ; Beira, in Portuguese territory, being the starting-point for a short trip, commencing, say, in August or September. Game is plentiful in this district, especially in the country adjacent to the Pungwe River.

As Portuguese Africa is referred to later, a few words may be devoted to the Kalahari district and Khama's country, bordering on western Bechuanaland, which form a last refuge for many fast-disappearing species of great game. Although covered with grass during the

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1. Waterbuck. *Cobus ellipsiprymnus*.
2. Brindled Gnu. *Connochætes taurinus*.
3. Gnu. *Connochætes gnu*.
4. Mrs. Gray's Kob. *Cobus maria*.
5. Wart Hog. *Phacochærus æthiopicus*.
6. Klipspringer. *Oreotragus saltator*.
7. Oribi. *Oribia scoparia*.
8. Steinbok. *Rhaphiceros campestris*.
9. Duikerbok. *Cephalophus grimmii*.
10. Lechwi. *Cobus leche*.
11. Grant's Gazelle. *Gazella granti*.
12. Ward's Reedbuck. *Cervicapra redunca wardi*.
13. Sömmerring's Gazelle. *Gazella sæmmerringi*.
14. Bushbuck. *Tragelaphus scriptus*.
15. Pala. *Æpyceros melampus*.

* * * For Measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.



rains, much of the Kalahari is almost a desert in the dry season, which renders travelling difficult, and thus serves as a protection to the animals, many of which then feed on water-melons and other water-bearing fruits. Here is the stronghold of the South African giraffe (*Giraffa camelopardalis capensis*); cama hartebeests are to be met with in troops, gemsbok are far from uncommon, and springbuck occur in considerable herds, although in no wise comparable to those of former days.

In this place may be mentioned the black lechwi (*Cobus smithemani*) from the Lake Mweru district—a noted game-haunt.

EAST AND EAST CENTRAL AFRICA.—From the standpoint of the present work the most important territories included under this heading are British Central and British East Africa; but they also comprise Portuguese and German East Africa.¹ Somaliland, Abyssinia, the Sudan, and the Red Sea Littoral, on the other hand, are considered under a separate heading.

As regards the animals of Portuguese East Africa, it may be mentioned that the black Cape baboon (*Papio porcarius*) is replaced in the territories north of the Zambesi by the yellow *P. cynocephalus*, a species common throughout tropical Africa south of the equator. Smaller monkeys of various kinds are abundant, while galagos are also to be met with. Lions are found in most districts, and abundantly in the Urema and Pungwe valleys, but rarely in the interior of the Mozambique province. The latter remark likewise applies

¹ See *Elephant Hunting in East Equatorial Africa*, by A. H. Neumann, and *Sport in East Central Africa*, by F. V. Kirby. London: Rowland Ward, Ltd.

to leopards; but servals are everywhere common, as are spotted hyænas, except in the interior of the aforesaid province. Of jackals, the dusky *Canis adustus* is widely distributed, whereas the black-backed *C. mesomelas* is local and rare. Throughout Portuguese East Africa and northern Zambesia buffaloes are still numerous, as they also are in the Shiré districts, but on the Urema and Pungwe they abound. Eland, *Taurotragus oryx livingstonei*, occur in suitable localities. Among other large antelopes may be named kudu, nyala, sable, roan, pala, reedbuck, waterbuck, defassa waterbuck (*Cobus defassa crawshayi*), blue wildebeest, Lichtenstein's hartebeest, and tsessebe; and of the smaller kinds, bushbuck, klipspringer, oribi, steinbok, duikerbok, Natal duiker, and Livingstone's suni (*Neotragus livingstonianus*). Bush-pigs and wart-hogs are, of course, to the fore, and hippopotamuses are fairly common, although they have to a considerable extent deserted the main stream of the Zambesi for the neighbouring lagoons. Bonte-quaggas and black rhinoceroses are to be met with in suitable localities over the greater part of the area. As regards elephants, these are seldom encountered during the dry season in the interior of the Mozambique Province, as they appear to migrate eastwards; but after the rains set in scattered troops may be found in many places throughout the southern portion of the Province—the Lomwe range, along the Namatimba and Mrumbi rivers, the Chiperoni and Mongwe mountains, the Lumwi and Ingundungwa ranges and the Lower Lualwa, Lugira, and Lukugu rivers. They are fairly numerous along the Mrupe and Mabo ranges, but do not occur beyond these until the Liuli is reached. In Portuguese northern Zambesia few, if any, probably now remain.

Passing northwards into British East Africa, Nairobi, which is reached by rail, forms the great centre for trips into Uganda and other hunting-grounds. In places abundance of game, occasionally including giraffes, may be seen from the train itself. Another starting-point is Landiani, on the Uganda railway, whence there is a good road to Ravine Station, from which the Gwasengishu plateau and the Nandi district may be reached. Between that plateau and the railway roads have been cut through the dense forests and bamboo jungles, and a number of Boer settlers, together with a few Englishmen, have been allotted farms in the neighbourhood, so that supplies are much more easily obtainable than in former days. Between Ravine Station and the Nzoia River the country consists of alternations of forest, open grass-downs, and thorn-scrub.

Writing in the *Field* of 1910, Mr. F. C. Selous states that "on all the open plains in East Africa to the east of Nairobi the great bulk of the game consists of zebras [bonte-quaggas] and Coke's hartebeests. But, besides the great multitude of these two species of animals, there are also in some districts considerable herds of wildebeests, as well as a fair number of Grant's and Thomson's gazelles and ostriches. On the high downs of the Guasengishu, however, and all through the tract of open thorn-bush extending to the Nzoia River, zebras and Jackson's hartebeests must form at least 99 per cent of all the game in the country, and were these two species eliminated, there would be very little game left. There are some small herds of topi here and there, both on the treeless downs and in open thorn-scrub. . . . Giraffes and elands, though they cannot be said to be scarce in the country between Siegoit Hill and Nzoia River, are yet not nearly so

plentiful as the South African representatives of these animals used to be thirty-five years ago in many districts between the Zambesi and Limpopo."

Special mention should be made of the number and boldness of the lions in the neighbourhood of the Tsavo River; a camping plain north of Taveta, near a swamp which feeds the river, being known as Marago ya Simba, i.e. the Camp of Lions.

In this place an article on the game of British East Africa, Uganda, and the Lado Enclave, kindly supplied by Mr. R. J. Cuningham, may be conveniently introduced in an abbreviated form, and with some slight emendations in the names of the animals in order to bring them into accord with those used in the rest of the work:—

"Owing largely to the facilities offered by the Uganda railway running from Mombasa to the Victoria Nyanza, also to the abundance of game and the large number of sportsmen that annually betake themselves to British East Africa, this portion of the continent is well known.

"To the north of Mombasa by the Shimba Hills are to be found the eastern sable antelope (*Hippotragus niger roosevelti*) and to the southward a few herds of elephants are often reported. If the railway is followed a favourite place for lesser kudu (*Strepsiceros imberbis*) and fringe-eared oryx (*Oryx beisa callotis*) is the neighbourhood of Voi, and from this station a large tract of country extending to Taveta, near Mount Kilimanjaro, forms a fairly good game country during and after the rains for zebra (*Equus burchelli granti*), kongoni hartebeest (*Bubalis cokei*), lion, rhinoceros (*Rhinoceros bicornis*), and at certain seasons elephants, which inhabit thick thorn-bush.

AFRICA

1. Cape Hartebeest. *Bubalis cama*.
2. Cape Buffalo. *Bos caffer*.
3. Lichtenstein's Hartebeest. *Bubalis lichtensteini*.
4. Black Rhinoceros. *Rhinoceros bicornis*.
5. White Rhinoceros. *Rhinoceros simus*.
6. Tsessbe. *Damaliscus lunatus*.
7. Western Hartebeest. *Bubalis major*.
8. Springbuck. *Antidorcas euchore*.
9. Coke's Hartebeest. *Bubalis cokei*.

* * For Measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.



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“Nairobi forms the chief centre where hunting expeditions are equipped and start. On the Athi Plains, along the Athi River, and on both banks of upper waters of the Tana River the following game is found: buffalo (*Bos caffer radcliffei*), giraffe (*Giraffa camelopardalis tippelskirchi*), lion, hippopotamus, rhinoceros, crocodile, Coke's hartebeest, wildebeest (*Connochætes taurinus albojubatus*), waterbuck (*Cobus ellipsiprymnus*), zebra, pala (*Æpyceros melampus*), ostrich, Thomson's gazelle (*Gazella thomsoni*), roan antelope (*Hippotragus equinus*), eland (*Taurotragus oryx livingstonei*), a race of klipspringer (*Oreotragus saltator schillingsi*), characterised by the presence of horns in the females, duiker (*Cephalophus abyssinicus hindei* and *C. harvei*), oribi (*Oribia montana* and *O. kenyensis*), leopards, servals, and many monkeys.

“Farther down the Tana, east of the grand falls, elephants are common at regular seasons, and on the north bank of this river in the same locality, Hunter's hartebeest (*Damaliscus hunteri*) is found, although few sportsmen endeavour to procure this strikingly handsome antelope.

“Kenia Mountain, with its rocky, snow-capped peaks and dense belts of forest, bamboos, and juniper, is the home of many elephants, while the giant forest-hog (*Hylochærus meinertzhageni*), and possibly the bongo (*Boöcercus euryceros isaaci*), dwell in the densest of the forest and bamboo areas. Buffalo, previous to the visitation of rinderpest in 1891, were very numerous on parts of the mountain, where they roamed up even to the snow-line, although now there is not one left. Bushbuck (*Tragelaphus scriptus heywoodi*), the little Zanzibar suni (*Neotragus moschatus*) and guereza monkeys are found among the foot-hills round the mountain.

“ East of Kenia the country is very waterless, but considerable numbers of rhinoceros are found by the scattered mud-holes. Northwards as far as the Guaso-Nyero River there are elephants, buffaloes, hippopotamus, Borani Grant's gazelle (*Gazella granti notata*), ostriches, lions, beisa (*Oryx beisa annectens*), zebras (both *Equus burchelli granti* and *E. grevyi*), giraffes (*Giraffa reticulata*), gerenuk (*Lithocranius walleri*) eland, Coke's hartebeest, Thomson's gazelle, waterbuck (*Cobus ellipsiprimnus*), wart-hog (*Phacochoerus æthiopicus*), and Chanler's reedbuck (*Cervicapra fulvorufula chanleri*).

“ The Guaso-Nyero seems to form the division between the ranges of *Equus burchelli granti* and *E. grevyi*; and here also the Borani race of Grant's gazelle merges into that of the aoul (*Gazella sæmmerringi*), which is found about Masarbit. Kudu (*Strepsiceros capensis*) also inhabit the hills in the neighbourhood. Around Lakes Rudolf and Stefanie immense herds of elephants were formerly to be found, but they have now been sadly reduced in numbers, and since the new southern Abyssinian boundary has been extended to the northern extremity of Lake Rudolf, the best elephant-country lies in Abyssinian territory. Buffaloes, lions, rhinoceros, the Somali giraffe, and Neumann's hartebeest (*Bubalis neumanni*) are numerous in the area between the Guaso-Nyero and Lake Rudolf.

“ West of Kenia there are vast plains inhabited by the ordinary fauna of British East Africa, including the local eland (*Taurotragus oryx pattersonianus*). Game is at times extremely abundant, especially in the shape of beisa. To the south of these plains runs the Aberdare Range, chiefly noted for its elephants, which usually frequent the bamboo-jungle. On the

tops of this range the so-called paar, a mountain form of the [†]duikerbok (*Cephalophus grimmii*) is fairly abundant. Following westward of these mountains comes Lake Harrington, in the neighbourhood of which are found kudu, although in small numbers. West of Lake Harrington lies the Guasengisho Plateau, which before the opening-up of the district to Boer settlers was teeming with game. This district forms the eastern limit of the Uganda kob (*Cobus kob thomasi*); while Jackson's hartebeest, bohor reedbuck (*Cervicapra fulvorufola wardei*), defassa waterbuck (*Cobus defassa*), five-horned giraffes (*Giraffa camelopardalis rothschildi*), topi (*Damaliscus corriganum jimela*), roan antelope, lions, rhinoceros, and elephants are more or less abundant.

“The locality most frequented by bongo is the densely wooded slopes of the Mau Escarpment near Molo where Mr. Kermit Roosevelt was probably the first white hunter to shoot a specimen. To ensure success, the co-operation of the forest-dwelling Wando-robo is essential. The forest-hog inhabits the same locality, but is rarely seen.

“As the foregoing remarks relate to the country north of the Uganda railway line, some brief information relating to the southern area may be added. Here a very large tract of land (some 10,500 square miles) is occupied as a game-reserve; its boundaries being, roughly speaking, the Uganda railway, from Tsavo to a little north of Nairobi, on the north; the German boundary on the south; Tsavo to Mount Kilimanjaro on the east; and from Nairobi to Lake Natron on the west. The two unreserved areas situated respectively east and west of the game-reserve occupy the district between Voi and Kilimanjaro. On the west of the reserve-line and extending up to the eastern shores

of the Victoria Nyanza there is a large tract of good game-country. In the Sotik district, and stretching to the German boundary, vast herds of topi, Grant's zebra, Coke's hartebeest, wildebeest, Grant's gazelle, and notably *Gazella granti robertsi*, rhinoceros, lions (in considerable numbers), buffalo, eland, roan antelope, pala, ostriches, wart-hog, giraffes (*G. c. tippelskirchi*), mountain reedbuck, klipspringer, chitas, and the smaller cats. In the Kisi district which is bordered by Lake Victoria, elephants are still numerous, but most frequently found in the tall, dense elephant-grass, which many sportsmen have no great desire to penetrate.

“Uganda is chiefly noted for its elephants and buffaloes; the former being very numerous, with some good tuskers, although these are not easy to find. Buffalo are not preserved, on account of their presence harbouring tse-tse fly. In the swamps surrounding Lake Victoria, as well as in the vicinity generally, situtunga (*Tragelaphus spekei*) are found, although in order to bag them it is necessary to wade to the middle of the swamps, often up to the shoulders. In the southern part of Uganda are a few elands, lelwel hartebeest (*Bubalis lelwel*), Grant's zebra, and various duikers. In the northern portion, in addition to the above, which occur in increasing numbers, are also roan antelope. In respect to lesser game, Uganda is not a very favoured country, and its chief attraction lies in its herds of elephant, buffaloes, and hippopotamus.

“The Lado Enclave, which has only recently become British territory, is the sole locality north of the Zambesi where the northern race of the white rhinoceros (*Rhinoceros simus cottoni*) is to be found. Even here these pachyderms are extremely local, and inhabit the bush-country opposite Wadelai (on the Nile) and also

the neighbourhood of Kiro, an abandoned Belgian post on the Nile. Elephants are scattered all over the Enclave, but in recent years have been much shot down, so that large tusked are rarely found; nevertheless, there is still an enormous number evenly distributed throughout this country. There are also a good many buffaloes (*Bos caffer æquinoctialis*), while the giant eland (*Taurotragus derbianus gigas*) may be found a few days west of Rejaf, and the lelwel hartebeest, bushbuck, kob, and defassa waterbuck occur in places."

Returning after this digression to the general survey of the fauna of the country, it may be mentioned in the first place that to enumerate all the species and races of game animals inhabiting this part of Africa would occupy more space than can conveniently be accorded, to say nothing of being wearisome to the reader. The bonte-quaggas of this area, notably the Athi plains, are *Equus burchelli granti* and *E. b. selousi*. Black rhinoceroses are still relatively common, some of them, at any rate, belonging to the type known as *Rhinoceros bicornis holmwoodi*. The two hartebeests mentioned above are *Bubalis cokei* and *B. lelwel jacksoni*; and there are also tiang (*Damaliscus corrigum tiang*). The Guasengishu oribi is a distinct species (*Oribia cottoni*), and a second kind (*O. kenia*) occurs in the Kenia district. Hunter's hartebeest (*Damaliscus hunteri*) is found on the north bank of the Tana river; and the small Thomson's gazelle (*Gazella thomsoni*) is an inhabitant of the district, where it is often found in association with *G. granti*, of which there are local races. Here also, especially in the neighbourhood of Lake Rudolf and Mount Kenia, the sportsman enters the habitat of the tiny dikdik antelopes (*Madoqua*). On

the northern shore of the Victoria Nyanza the Uganda kob (*Cobus coba thomasi*) takes the place occupied by the puku farther south. The Uganda bohor reedbuck (*Cervicapra bohor wardi*) is also a native of the same district. Pala, blue wildebeest, reedbuck, bushbuck, nyala, and duiker are found in the neighbourhood of Kilimanjaro. The topi (*Damaliscus corrugum jimela*) is an eastern race of a western species. The fringe-eared beisa (*Oryx beisa callotis*) is a native of the plains round the mountain; the Laikipia eland is *Taurotragus oryx pattersonianus*; kudu occur locally, and the southern range of the lesser kudu (*Strepsiceros imberbis*) includes German and British East Africa.

The Semliki forest, on the eastern border of the Congo Free State, is the home of the okapi (*Ocapia johnstoni*), which ranges into the Congo and southern Bahl-el-Ghazal; and in the forest-tract of this side of the continent is also found the eastern race of that magnificent antelope, the bongo (*Boöcercus euryceros isaaci*). The giraffe of the Lake Baringo and Mount Elgon districts is a five-horned race (*Giraffa camelopardalis rothschildi*), characterised by the difference in the colour of the two sexes. Nearer Lado another race (*G. c. cottoni*) is met with; while the Kilimanjaro race (*G. c. tippelskirchi*) is likewise distinct. Forest-hogs (*Hylochaerus*) are found from the Semliki to Kenia. Lado and the southern districts of the Bahr-el-Ghazal are the haunts of the Sudani race of Lord Derby's eland (*Taurotragus derbianus gigas*), and likewise of the northern form of the white rhinoceros (*Rhinoceros simus cottoni*); the latter being perhaps one of the originals of the unicorn.

The Njiri plain is a great resort of game; and between Lake Naivasha and the mountains, as well as

to the north of Naivasha, are other grassy plains teeming with game. The lake itself is the home of countless thousands of pelican, ibis, duck, and other water-birds, as well as of hippopotamuses. Between this and Mount Kenia are many hunting-grounds, while on the western flanks of the mountain the trackless forests abound with elephants and buffaloes. It may be added that the Ankoli buffalo is *Bos caffer radcliffei*, while the one found near Lake Kivu is *B. c. mathewsi*, and the name *B. c. neumanni* has been given to the Uganda animal. All these are black, but on the Semliki *B. c. cottoni* the bulls are red until fully adult.

The country between Kenia and Lake Baringo in a direction north-west by west is covered with forest, with several rivers; and elephants, buffaloes, bonte-quaggas, rhinoceroses, and giraffes occur in astonishing numbers. North of Baringo lies the Enzobot elephant forest.

A race of the striped hyæna (*Hyæna striata schillingsi*) inhabits East Africa. Black and white guereza monkeys (*Colobus guereza* and *caudatus*) abound in the Uganda forests, where their long mantle of white hair harmonises so well with the pendent lichens on the trees, that they are almost invisible. In the rivers and lakes are hippopotamuses and some crocodiles. Immediately west of the Victoria Nyanza and Uganda, within the Congo basin, where the forest-tract is entered, a race of the chimpanzee (*Anthropopithecus troglodytes*), and likewise the Uganda potto (*Perodicticus ibeanus*) are to be found. Here, too, occurs the otter-shrew (*Potamogale*), and likewise a race of the water-chevrotain (*Dorcatherium*), both of which, like the two animals last mentioned, and also the bongo, were long supposed to be confined to the west coast.

SOMALILAND, ABYSSINIA, AND THE EGYPTIAN SUDAN.¹
—Partly owing to its accessibility, and partly to the abundance of its game, Somaliland is a favourite sporting-ground, although now by no means so good as formerly. It is specially remarkable for the number of its antelopes, several of which are peculiar to the district, some inhabiting the low ground in the neighbourhood of Berbera, while others are restricted to the Haud, or plateau of the interior. They include Swayne's hartebeest (*Bubalis swaynei*); several species of dik-dik (such as *Madoqua swaynei*, *phillipsi*, and *guentheri*); the klipspringer; the beira (*Dorcatragus megalotis*), the sole representative of its genus; the defassa waterbuck; three gazelles, *Gazella pelzelni*, *spekei*, and *sæmmerringi*, the last being a large species, locally known as aoul. The dibatag, or Clarke's gazelle (*Ammodorcas clarkei*), is peculiar to the country; and there also occur gerenuk (*Lithocranius walleri*), whose range extends into East Africa, beisa, Abyssinian bushbuck (*Tragelaphus scriptus decula*), and both kinds of kudu. The Somali giraffe (*Giraffa reticulata*) is a very distinct form. Equally distinct is the Somali lion (*Felis leo somaliensis*), which is numerous in the forest on the slope near the coast; and leopards abound, one of these being a very small race (*F. pardus nanopardus*). The aard-wolf, the hunting-dog, the big-eared fox, and the ant-bear also range as far north as Somaliland, where each is represented by a local race. The aard-wolf is also found. There is likewise the large and handsome Grévy's zebra (*Equus grevyi*), distinguished by

¹ See *Seventeen Trips through Somaliland and a Visit to Abyssinia*, by Lt.-Col. H. G. C. Swayne, and *A Sporting Trip through Abyssinia*, by Major P. H. G. Powell-Cotton. London: Rowland Ward, Ltd.

its narrow striping and huge ears, which is also found in the Shoa country, as well as a wild ass (*Equus asinus somalicus*) and the wart-hog. May, June, and December are the best months for Somali shooting, and to a party arriving in April, Berbera is the best landing-place. Starting thence with camels, Mandara, a valley under the Gnu Libah Mountain, in the Golis range, forms good head-quarters. Beyond that range, at Gulaneh, elephants, giraffes, and rhinoceroses (*Rhinoceros bicornis somaliensis*) were formerly common, and there are still a few rhinoceroses in the hills; but the Somali elephant (*Elephas africanus orleansi*) is now restricted in the northern districts to the vicinity of Hargeisa, Jifu Medir, and the Gadabursi hills, where it is strictly preserved. To the southward elephants are found in western Ogaden.

Somaliland, in common with East Africa, is the home of the large African crested rats of the genus *Lophiomys*; the Somali species, known to the natives as yaidado, being *L. smithi*.

The Somali ostrich forms a distinct species or race (*Struthio molybdophanes*). Among other birds may be mentioned the Somali guinea-fowl (*Numida somaliensis*); the handsome vulturine guinea-fowl (*Acryllium vulturinum*), ranging southwards to Kilimanjaro; several francolins, such as *Francolinus spilogaster*, *kirhi*, *gutturalis*, and *lori*, of which the last is restricted to the Gulis range; the Somali courser (*Cursorius somaliensis*); the European thick-knee (*Ædicnemus crepitans*), and the North African desert form which has been separated as *Æ. saharae*; the Egyptian goose; the shoveller duck (*Spatula clypeata*) and teal, in winter; together with bustards, plovers, the avocet (*Recurvicostra avocetta*), etc.; and the small African bronze-dove (*Chalcopelia afra*). Other interesting birds

are the blue roller, a bee-eater (*Merops cyanostictus*), a shrike (*Prinops poliocephala*), a paradise-flycatcher (*Terpsiphone cristata*), a woodpecker (*Thripias shoënsis*), a kingfisher (*Halcyon chelicutensis*), a weaver (*Dinemellia ruspolii*), together with hornbills, sunbirds (*Nectariniidæ*), and numerous eagles and owls.

Although Abyssinia and Gallaland are not much visited by sportsmen, the mountains of the interior abound with game, many of the species of which are identical with those of the more southerly districts of Eastern Africa, or of the Sudan, while a few are peculiar. The wala or Abyssinian ibex (*Capra vali*), for instance, as already mentioned, inhabits the highlands of Simien, and indicates that the district is on the borderland between the fauna of Africa south of the tropic with that of North Africa. The same mountains are the home of the cuberow (*Canis simensis*), a peculiar member of the dog tribe regarded by some naturalists as a kind of overgrown fox, but by others as intermediate between wolves and jackals. The buffalo of the White Nile is *Bos caffer æquinoctialis*, and this race may range into Abyssinia, which is the home of the typical form of the defassa waterbuck (*Cobus defassa*). The roan antelope is represented by a local race (*Hippotragus equinus bakeri*); and a race of the bohor reedbuck (*Cervicapra redunca bohor*) is also a native of Abyssinia.

Both species of kudu are met with in the country, the larger kind being represented by *Strepsiceros capensis chora*, which is common to Somaliland; and the local bushbuck is *Tragelaphus scriptus decula*. Tora, or titel hartebeests (*Bubalis tora*) and wart-hogs are common; gazelles of three kinds are numerous, and come close to the houses; and dik-dik are likewise abundant.

The giraffe of this district and of the adjacent side of upper Nubia is the typical *Giraffa camelopardalis*; while the Kordofan animal is a distinct race (*G. c. antiquorum*). The gelada baboon (*Theropithecus gelada*) is likewise a characteristic inhabitant of the Abyssinian highlands. Grévy's zebra is represented by the typical race, which differs in colour from the Somali *Equus grevyi berberensis*; and the Abyssinian and Sudani elephant is *Elephas africanus oxyotis*. Lions are to be found in the hills, from which they descend when the grass is burnt; and leopards, although rarely seen, are common.

Among the birds of Abyssinia reference may be made to the remarkable pennant-winged nightjar (*Macrodipteryx longipennis*), the sole member of its genus, which also ranges into East and West Africa. A closely allied bird is the standard-winged nightjar (*Cosmetornis vexillarius*), whose range extends across the continent from East to West Africa. Another characteristic species is the Abyssinian ground-hornbill (*Bucorax*, or *Bucorvus abyssinicus*), which also ranges into West Africa; and there is likewise a member of another African group of hornbills, *Bycanistes cristatus*, which extends into East Africa.

In the Hawash valley and the neighbourhood of Lake Zwei, Arusi Gallaland, is found a bright red bushbuck (*Tragelaphus scriptus multicolor*); but in the highlands at the source of the Webbi Shebeyli and on the Sahatu Mountains, at a height of some 9000 feet, this is replaced by the black *T. s. meneliki*. The Sahatu Mountains are also the home of the mountain nyala (*T. buxtoni*), discovered by Mr. Ivor Buxton in 1910.

The swamps of the White Nile, the Bahr-el-Ghazal, and the Sobat, are the haunts of that beautiful member

of the waterbuck group known as Mrs. Gray's kob (*Cobus maria*), the adult males of which are deep black, relieved with white. The last-named valleys are likewise the habitat of the white-eared kob (*C. leucotis*), of which the old males are likewise black; but in the southern Bahr-el-Ghazal this is replaced by the foxy-coloured *C. vaughani*.

For shooting on the Nile south of Khartum the best months are April and May, when the grass is burnt off, and the game come down to the Nile, as most of the inland streams are dried up. At other times the grass is eight or nine feet high, and the game hidden. Among birds, it must suffice to refer to the great boat-billed stork (*Balæniceps rex*) of the upper White Nile, as an altogether peculiar type.

Passing to the Red Sea littoral, the following particulars are from notes furnished by Mr. A. B. Wylde. In the mountains Nubian ibex (*Capra nubiana*) are abundant, bucks with good horns being obtainable in the Elba and the Erta Mountains, as well as in the Bowartie and Asortriba Mountains, near Suakim. Between these mountains and the coast occur dorcas gazelles, the North Arabian bustard, (*Eupodotis arabs*), and the hubara bustard, although the latter is rare. There are also hares, thick-knee, and duck and quail in the proper season. Hey's sisi partridge (*Ammoperdix heyi*) is common in the mountains, where droves of dog-faced baboons are occasionally met. The udad is found, although rarely, two days' march west of Bowartie. The northern limit of Sömmerring's gazelle reaches the coast at Durur, and on the coast plains a few ostriches are still found. Wild asses occur some days' march from the coast, but are in danger of extermination, owing to the railway.

To the south-west of Suakim are the mountains of Singat and Erkowit, where good sport can be obtained, since, in addition to ibex, klipspringer, and Salt's dik-dik (*Madoqua saltiana*), Hey's sisi, Rüppell's and Erckell's francolins, and the Abyssinian guinea-fowl are to be met with. Leopards are still found round Erkowit; but lions have been exterminated north of the Baraka.

Another shooting district on the Egyptian Red Sea littoral is entered from Aghig, ninety miles south from Suakim, and is far the best from the sportsman's point of view. In addition to the game mentioned above, beisa, tora hartebeest, and the addra gazelle (*Gazella dama ruficollis*) are found on the plains and in the valleys; while at the foot of the hills wart-hogs and kudu are common. Lions and leopards often descend to the plains, and a few rhinoceroses still survive. Five to six days' march farther inland elephants and buffaloes may be encountered, as well as several antelopes different from those already enumerated. Several good shooting trips may be made from Massowa; one through the Beni Amer country, crossing the Khor Baraka into the Basē district, and returning viâ Sanheit and Kelamet. A second viâ Asmara to the Walkeït country; shooting being obtainable immediately after proceeding westward from Gudu-felasie. One short trip would be through the Shoho and Asorta districts to Halaï, and a second through the Hartan Peninsula of Danakil, and thence back to Ariphele, south of Annesley Bay.

The country northwards of Aghig appeals to the naturalist rather than to the sportsman, small animals being more abundant than big game. A sportsman leaving London could be among the ibex in a fortnight, and among other big game, viâ Massowa, in three

weeks. The shooting season is from October till the end of April; the three bad months being June, July, and August.

Although Erythrœa is to a great extent a closed country, sportsmen wishing to go to Massowa, the chief town of the Italian colony, can book fortnightly from Naples direct to Massowa, or weekly viâ Aden, by the Italian mail-boats, and the voyage from London to Massowa need not exceed fourteen days. Trackers and trustworthy guides for the surrounding country can be procured at Massowa, where there is hotel accommodation, and supplies can be procured in the interior at Asmara and Keron, to which there are good roads.

In this place reference may conveniently be made to a few remarkable types of African fishes. Foremost among these are the members of the family *Polypteridæ*, as typified by the bichir (*Polypterus bichir*) of the Nile. These are elongated, mail-clad fishes, with the back-fin split up into a number of finlets, and the pectoral fins consisting of a fringe radiating from a basal axis. They are survivors of a very ancient type, and inhabit tropical Western and Central Africa. Equally remarkable are the African lung-fishes (*Protopterus*), with a nearly similar distribution, and belonging to a family (*Lepidosirenidæ*) represented elsewhere only in South America. Notable on account of their extraordinary form are the beaked fishes (*Mormyridæ*), which constitute an exclusively Ethiopian family, with many genera and species.

WEST AFRICA.—Algeria, Tunisia, and Morocco having been discussed under the heading of North Africa, attention may be directed to the west coast, from Senegambia to Angola. Till comparatively few

years ago the greater part of these districts was unknown as hunting-fields ; but they have been gradually opened up, although some provinces are still practically new ground. To the Gambia there is a fortnightly steam service, but despite this, and the comparative healthiness of the climate in the dry season, it is visited by few sportsmen. The country is specially rich in antelopes, including the western hartebeest (*Bubalis major*), the korrigum (*Damaliscus corriganus*), the red-flanked duiker (*Cephalophus rufilatus*), Maxwell's duiker (*C. maxwelli*), the crowned duiker (*C. coronatus*), the Gambian oribi (*Oribia nigricaudata*), the sing-sing (*Cobus defassa unctuosus*), Buffon's kob (*C. kob*), the bohor reedbuck (*Cervicapra redunca*), the red-fronted gazelle (*Gazella rufifrons*), the white oryx (*Oryx leucoryx*), the western roan antelope (*Hippotragus equinus gambianus*), the western or typical bushbuck (*Tragelaphus scriptus*), and the typical form of Lord Derby's eland (*Taurotragus derbianus*). The buffalo forms a distinct small race (*Bos caffer planiceros*).

The Gambia river is stated to be navigable, even for large ocean-steamers, for a distance of some 300 miles ; and the country in the neighbourhood affords good sport. The best months are from March to May, when the climate is dry ; after this the heat becomes intense, the rainy season lasting from July to October.

The coast and adjacent hinterland from Liberia to the Congo forms what may be called the typical West African forest-region. For many years the fauna of this tract was supposed to be absolutely peculiar ; but the opening-up of central Equatoria has shown that a large number of the genera, and even of the species, range through the forest as far east as Uganda and the Semliki. Perhaps the most notable

of all is the gorilla (*Anthropopithecus gorilla*), which inhabits the coast-districts in the neighbourhood of the Gabun and Cameruns, extending south towards the Congo, and eastwards to German East Africa. Here, too, occurs the typical race of the chimpanzee (*A. troglodytes*), although its range also extends eastwards far into the heart of the continent. Those ugly baboons, respectively known as the mandrill and drill (*Maimon*), are likewise from the west coast; as are also the species of thumbless lemurs, named pottos (*Perodicticus*) and awantibos (*Arctocebus*). Whereas, however, pottos range into Uganda, the other two genera are at present known only from the western districts. The scaly-tailed squirrels, either with a parachute (*Anomalurus* and *Idiurus*), or unprovided with the same (*Zenkerella*), are also West African, although the first genus reaches Uganda. The same is the case with the aquatic otter-shrew (*Potamogale*), which frequents the streams on both the western and eastern borders of the forest. On the other hand, the pigmy hippopotamus (*Hippopotamus liberiensis*) is restricted to the swampy forests of Liberia, Sierra Leone, etc.; while the red river-hog (*Potamochoerus porcus*) is also an exclusively western type, although represented by other species elsewhere. The forest-hog (*Hylochoerus*) of the Cameruns has been specifically separated from the typical eastern (*H. meinertzhageni*), although it is doubtful if it represents more than a local race. By far the finest of the West Coast antelopes is the typical race of the bongo (*Boöcercus euryceros*), whose habitat is Fanti and the Ashkankolo Mountains. Other antelopes are the western race of the situtunga (*Tragelaphus spekei gratus*), from the Gabun; and the beautiful banded duiker (*Cephalophus dorice*), from

Fanti and the neighbouring districts. The yellow-backed duiker (*C. sylvicultor*) and Jentink's duiker (*C. jentinki*), which approach a donkey in size, are likewise West African, although the former is represented by nearly allied species, or races in north-west Rhodesia and the Ituri forest. Buffon's kob is also found in West Africa. The district is likewise the home of the typical pigmy antelopes, such as *Neotragus pygmaeus* and *N. batesi*; the group being represented in the Ituri by *N. (Hylarnus) harrisoni*. The dwarf red buffalo (*Bos caffer nanus*) apparently ranges from Ashanti to the Congo; and there are other races of the species in the Congo, Togoland, etc., which it is impossible to particularise in this place.

In the open districts of Upper Nigeria occurs a western race of the giraffe (*Giraffa camelopardalis peralta*).

The west coast is the home of the typical race of the water-chevrotain (*Dorcatherium aquaticum*), represented in the Ituri by another race. In addition to the aforesaid baboons, monkeys of many kinds abound in the forests, one of the most striking being the hairy guereza (*Colobus vellerosus*), which now stands in danger of extermination on the Gold Coast, owing to the commercial value of its long silky fur. Pangolins are also abundant, and include the largest of all, *Manis gigantea*.

To mention birds in any detail is absolutely forbidden by lack of space. It may, however, be observed that many of the beautiful pheasant-turacos, such as *Turacus buffoni*, are characteristically West African, as is the magnificent violet plantain-cutter (*Musophaga violacea*), which may be found perched on the highest trees of the Gold Coast. Two species of guinea-fowl,

namely, the black guinea-fowl (*Phasidus niger*) and the Turkey guinea-fowl (*Agelastes meleagrides*), are likewise inhabitants of this region. The three kinds of grey parrot are West African, although the common *Psittacus erythacus* ranges eastwards into the heart of the continent.

West Africa is likewise the home of a peculiar generic type of crocodile, *Osteolæmus tetraspis*. This region is also the typical locality for the goliath-beetles (*Goliathus*), the largest representatives of their group, although the group extends through the forest-zone to Uganda. It is likewise noticed for the number and brilliance of its butterflies.

Much of the West African country is not easy of access to British sportsmen; and some of it is by no means well supplied with big game. In Ashanti, for instance, the district between Cape Coast Castle is poorly off in this respect, although an oribi, perhaps identical with the Gambian species, is occasionally seen, and there are some half-dozen other kinds of small antelopes. North of Kumasi francolins occasionally venture out of the dense bush; the west coast species including *Francolinus lathamii*, *F. bicalcaratus*, *F. squamatus*, and *F. ahatensis*.

Nigeria is a district where English sportsmen can penetrate far into the interior; Lokoja being a locality where game is abundant, although, owing to the density of the forest, shooting is difficult. Large droves of hippopotamus are to be met with on many parts of the river; and other big game include the western hartebeest, the western race of the roan antelope, numerous smaller antelopes, such as duiker, klipspringer, and oribi, while wart-hog, and tracks of elephants, lions, and leopards are constantly seen. West African leopards,

such as *Felis pardus leopardus* of the Guinea coast, differ from the northern and eastern representatives of the species by their smaller and more numerous spots. The African tiger-cat (*F. celidogaster*), remarkable for its different colour-phases, occurs throughout these districts, extending westwards to the Ituri.

From Lokoja sportsmen may reach the Borgu country, where the natives, who use poisoned arrows, do a good deal of hunting on their own account.

Although abundant sport is obtainable in the French and Belgian Congo—elephants still occurring in large herds in many districts—the country being under foreign dominion renders it less easy of access to British sportsmen than would otherwise be the case.

In the Portuguese territory of Angola sporting trips may be made from Benguela. The game includes buffalo, roan antelope, kudu, the Angola sing-sing (*Cobus defassa penricei*), springbuck, the black-faced or Angola pala (*Æpyceros petersi*), and many smaller antelopes. The Angola giraffe (*Giraffa camelopardalis angolensis*) is a distinct race. There is also a local race of the zebra (*Equus zebra penricei*). Many of these animals, it will be noticed, are identical with or nearly allied to South African species; and indeed when the southern provinces of Angola are reached, the fauna is practically the same as that of the districts still farther south.

MADAGASCAR.—From the absence of large game of all kinds, the great island of Madagascar can scarcely claim to be regarded as a hunting-field in the proper sense of the word, yet its animals are so peculiar, and so unlike those of the rest of the world, that they can scarcely be passed over without mention. All the large mammals characteristic of Africa are wanting,

with the exception of a species of bush-pig (*Potamochoerus edwardsi*) ; and largest carnivore is the fossa (*Cryptoprocta ferox*), a creature serving in some degree to connect the civets with the cats. There are several peculiar generic types of the mongoose tribe, such as *Galidictis* and *Eupleres*. The essential peculiarity of the mammalian fauna of the island is, however, the extraordinary development of lemurs, which are quite different from those of Africa, where, as already mentioned, the group is represented by gallagos and pottos. The largest are the sifakas (*Propithecus*) and the indri (*Indris*) ; the former being numerous in species and long-tailed, whereas the single representative of the latter is a short-tailed animal. They are further remarkable for the large amount of white which enters into their colouring, and the general brightness of their tints. In many parts of the island almost every copse holds a sifaka ; and in the evening they may be seen in numbers passing from one patch of cover to another. The ring-tailed lemur (*Lemur catta*) frequents rocky districts ; but the other true lemurs, of which there are many, are forest-dwelling creatures like the sifakas. Still more remarkable is the aye-aye (*Chiromys madagascariensis*), a long-haired, brush-tailed lemur, with curiously slender fingers (one especially so) and toes, and front teeth recalling those of rodent. Although of small bodily size, reference must likewise be made to the peculiar tenrecs (*Centetidæ*), which are restricted to the island, and some of which resemble miniature hedgehogs in general appearance.

It may be added that the Mascarene Islands, such as Réunion and Rodriquez, together with the Aldabra group and the Seychelles, are the last localities in the

Old World where giant land tortoises still survive in a state of nature.

GREENLAND AND ARCTIC AMERICA.—With Alaska, the northern districts and islands of the Dominion of Canada, and Greenland may be commenced a survey of the hunting-grounds and game of the New World. It must be mentioned, however, that the area is so great and the number of mammals and birds so large, that only a brief and cursory notice can be attempted. In Arctic America and the northern portion of the territories to the southward many of the animals are more or less closely allied to those of Northern Asia and Europe; but as the traveller proceeds farther south he will notice a gradual disappearance of Old World types, until in Central and South America he meets a fauna unlike that of any other part of the world.

Among the strictly Arctic mammals of the Western Hemisphere, the Polar bear (*Ursus maritimus*) and the Arctic fox (*Canis lagopus*) are severally identical with their Old World representatives. Seals of various kinds, among which may be mentioned the Greenland *Phoca grænländica*, as well as whales and porpoises, for the most part identical with eastern species, abound in these seas. Certain islands in Bering Sea are the home of fur-seals, or sea-bears (*Otaria ursina*), as well as of sea-lions (*O. jubata*) and sea-otters (*Lutra lutris*); but since the killing of these is under special regulations, they are of no interest to the sportsman. The Pacific walrus (*Odobæenus rosmarus obesus*), which has finer tusks than its Atlantic relative, is always obtainable on the northern coasts of the Pacific. The most remarkable large game animal of the Arctic districts of the Western Hemisphere is, however,

the musk-ox (*Ovibos moschatus*), the range of which extends from the shores of the Arctic Ocean to about the 60th parallel, but does not now reach westward of the Mackenzie river or Alaska. The southern limits of the species seem to be gradually contracting. Northwards and eastwards musk-oxen extend through Parry Islands and Grinnell-land to north Greenland, reaching on the west coast as far south as Melville Bay, and having been also met with at Sabine Island on the east coast. The East Greenland and Grinnell-land animal (*O. m. wardi*) is a distinct race, with much white on the face. A little to the eastward of the Peace river musk-oxen were recently numerous, and many were killed by hunters.

Alaska, of which the area is nearly one-fifth that of the United States, is one of the finest and largest game-areas in the world. Its varied climate, broad rivers, innumerable lakes, dense forests, and lofty mountain chains render the country an almost ideal resort; and the territory enjoys the further distinction that several of its big-game animals are larger than their representatives in almost any other country, if not in the world. The large bodily size and numerical abundance of the big game of Alaska compensate, to a great extent, for the small number of its species as compared with the variety in many other game-countries, such as East Africa, and, in the old days, South Africa. In addition to the aforesaid white bear and Pacific walrus, the game of the territory includes moose (elk), caribou (reindeer), black-tailed deer, white mountain-sheep, white mountain-goats, and brown, grisly, black, and glacier bears; while in addition to these there is a vast variety of water-fowl, shore-birds, and upland game-birds.

THE NEW WORLD
(NORTHERN AMERICA, GREENLAND, NEWFOUND-
LAND, Etc.)

1. Virginian White-tailed Deer. *Mazama americana*.
2. Mule Deer. *Mazama hemionus*.
3. Caribou. *Rangifer tarandus*.
4. Greenland Musk Ox. *Ovibos moschatus wardi*.

* * For Measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.



Regarding the ruminants of Alaska and the adjacent territories, other than the musk-ox, already mentioned, the Barren-Ground race of the reindeer or caribou (*Rangifer tarandus arcticus*) ranges from the shores of the Arctic Ocean to the northern limit of forests, and is represented by a closely allied race in Greenland (*R. t. grænländicus*). The larger and darker woodland reindeer (*R. t. caribou*), together with certain other varieties and races, ranges in Alaska as far north as the wooded districts of the upper Yukon. The Barren-Ground caribou was once exceedingly numerous on the tundras of Alaska; but even so early as 1877 it had become scarce on the coasts of Bering Strait, and since that date its numbers have much diminished in the interior. The Alaskan elk, or moose, which inhabits the same ground as the woodland reindeer, is so much larger than the animals found farther south, that it may be regarded as a separate race (*Alces machlis gigas*); its antlers are immense. Very characteristic of the country is the Alaskan big-horn sheep (*Ovis canadensis dalli*), which is nearly pure white; and whose horns and ears are intermediate in character between those of the Kamchatkan and Rocky Mountain big-horns.

As regards its brown bears, Alaska vies with Kamchatka in claiming the record in point of bodily size, while in the matter of local variation the representatives of this species in the former country put the rest of the world in the shade. For American naturalists recognise no fewer than half a dozen brown bears in Alaska alone. These include the Kodiak bear (*Ursus arctus middendorffi*) of Kodiak Island, the Alaskan Peninsula bear (*U. a. gyas*), the Yakutat bear (*U. a. dalli*) from the neighbourhood of Yakutat Bay and the coast for an undetermined distance north and south, the Sitka

bear (*U. a. sitkensis*) of Baranow Island, the Admiralty bear (*U. a. urolophus*) of Admiralty Island, and Kidder's bear (*U. a. kidderi*) of the Alaskan Peninsula. It is, however, admitted even by Americans that, with the exception of the last three, which are smaller than the others and supposed to be of uncertain relationship, all these varieties are similar in general characteristics and appearance, and that their claims to distinction are apparent only to experts. The sportsman, if not the naturalist, may therefore be forgiven for lumping them together. The brown bears come out of hibernation early, usually in spring, and so soon as the salmon begin to swarm up the rivers, subsist on such nutritious and easily obtained diet. That these bears, which a few years ago were extraordinarily numerous, will become scarce, is certain. Such formidable creatures, even though disinclined to attack human beings, are regarded as a menace to travellers, and therefore unworthy of protection. Already they have become scarce on Kodiak Island, where they were once so abundant; while although still fairly numerous on the Alaskan Peninsula, they are being killed off at a rate probably in excess of their increase by reproduction. On the other hand, in the dense primeval forests of the north-eastern districts, as well as on Mount Elias, they may hold their own longer.

The grizzly, or grisly, bears of Alaska, distinguished by their white claws, include two varieties, namely, *U. horribilis phæonix* of the interior, and *U. h. kenaiensis* of the Kenai Peninsula and adjacent coast-districts. They spend the summer chiefly above or near the limit of forest, and are most numerous in the Endicott, Nutzotin, and Alaskan mountains. The glacier-bear

(*U. americanus emmonsii*), inhabiting the southern slopes of the St. Elias range and neighbouring mountains from Crow Sound to the vicinity of Cape St. Elias. Although believed to live near the glaciers, little is known concerning this bear, which is probably represented by less than a dozen specimens in museums. In size and general characteristics the glacier-bear is like the ordinary black bear, from which it differs in its silver-grey colour slightly mixed with black, brown nose, and blackish feet.

Since most of the other large mammals inhabiting Arctic America are common to the districts farther south, they may conveniently be noticed below. It may be mentioned, however, that during spring and summer the otherwise desolate tundras of Alaska teem with bird-life. At this season the country is the resort of the Canada goose (*Branta canadensis*), the white-fronted goose (*Anser albifrons*), and the snow-goose (*Chen hyperboreus*), together with swans and numerous species of fresh-water ducks. The handsome harlequin-duck (*Harelda glacialis*) is met with on the smaller tributaries of the Yukon; and in addition to all these, sand-hill cranes (*Grus canadensis*) and various kinds of wading birds abound. On the coast of Bering Sea the gunner may bag four species of eider-duck (*Somateria*), including the spectacled, king, and Steller's eider. Here, too, occurs the handsome emperor-goose (*Philacte canagica*), which is peculiar to North America. The black brent goose (*Branta nigricans*) passes in huge flocks every spring along the shores of Bering Sea, affording magnificent sport to the gunner while the flight lasts. During their sojourn in Alaska all ducks get excessively fat and remarkably well-flavoured from feeding on a kind of blueberry growing on the

bare coast-hills. Two kinds of ptarmigan, namely, the European *Lagopus mutus* and *L. rupestris*, common to Siberia, frequent the mainland; one of these collecting in large packs during winter. Other species inhabit the islands.

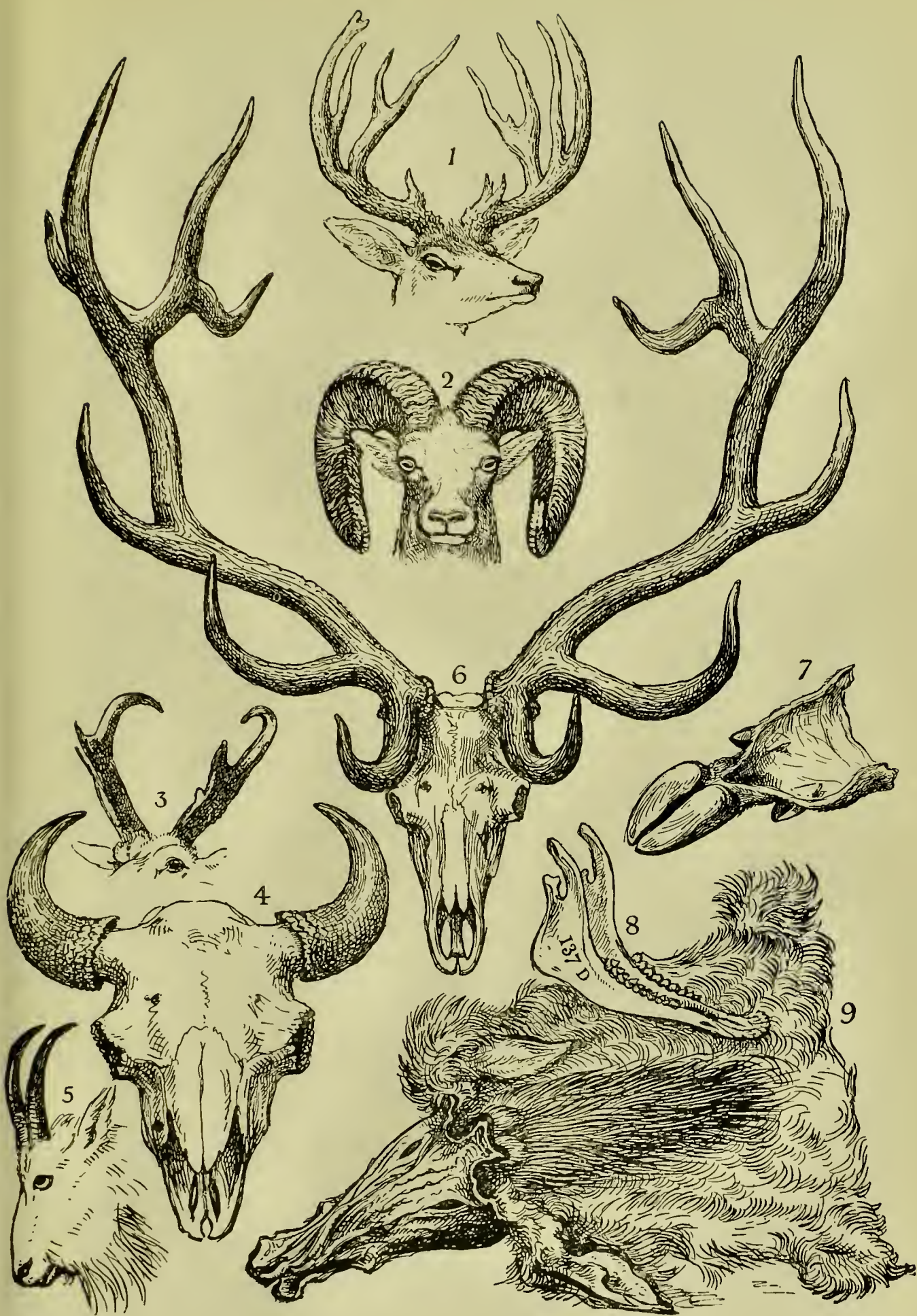
SOUTHERN CANADA, UNITED STATES, AND MEXICO.—To the southward of the limit of the range of the musk-ox lies the region containing what may be regarded as the typical of North American fauna, which continues approximately as far south as lower Mexico. The chain of the “Rockies” forms an important feature in this area, enabling northern types of animals to range much farther south than would be the case were this elevated tract non-existent. Throughout a large part of Canada and the United States the progress of influences tending to disturb great game and restrict their range has been more rapid during the last half century than in almost any part of the world; one of the results being the practical extermination of the American bison.

The American bison (*Bos bison*), miscalled buffalo, has practically ceased to be an animal of sport; there are two races, the typical *Bos bison* of the prairies, and the woodland *B. b. athabascæ*. Some of the latter remain in the neighbourhood of the Peace River in Canada; and there are numerous herds of bison kept in a state of confinement in various parts of the United States. Of the other hollow-horned ruminants, the finest is the Rocky Mountain sheep or big-horn (*Ovis canadensis*), of which the typical race inhabits the mountains from which it takes its name. In addition to the Alaskan form already noticed, there are other local races, such as the north-western *O. c. stonei* from the upper part of the Stikin river, at no very great distance from the Alaskan frontier, and the Liard

NORTH AMERICA

1. Black-tailed Deer. *Mazama columbiana*.
2. Big-horn, or Rocky Mountain Sheep. *Ovis canadensis*.
3. Prong-Buck. *Antilocapra americana*.
4. American Bison. *Bos bison*.
5. White Goat. *Oreamnus montanus*.
6. Wapiti. *Cervus canadensis*.
7. Deer Slot—to show skinning.
8. Wapiti—lower jaw.
9. Scalp of Wapiti, as prepared on the field.

* * * For Measurements of Horns, Weights of Big Game, and other Statistical Information, see *Records of Big Game*, by Rowland Ward. Sixth Edition, 1910. London : Rowland Ward, Ltd.



river ; and the southern *O. c. nelsoni*, from the Grapevine Mountains between California and Nevada, and some of the neighbouring districts. Large horns of big-horn are now difficult to obtain ; British Columbia being one of the best districts in which to procure this fine sheep.

One of the most characteristic of North American animals in the white goat (*Oreamnus*, or *Haploceros montanus*), distinguished by its white shaggy winter-coat, and black horns. It is not really a goat, but allied to the serows of Asia. The best localities for this ruminant are in British Columbia, but it extends into Alaska.

For elk, or moose (*Alces machlis americanus*), the best grounds are in Canada, especially in Nova Scotia, New Brunswick, and the district to the south of James Bay towards Lake Winnipeg. The range of the woodland reindeer, or caribou (*Rangifer tarandus caribou*), extends from the limit of forests southwards to Nova Scotia, New Brunswick, northern Maine, and lower Canada on both sides of the St. Lawrence, thence passing westwards through the district north of Quebec to the neighbourhood of Lake Superior, south of which the species is unknown. Next to the elk, the largest deer in the New World is the wapiti, almost invariably miscalled elk on the other side of the Atlantic. The eastern or typical race (*Cervus canadensis*) ranges on the east side of the Rockies from about lat. 57° to Wyoming and Montana, but has been exterminated from many districts where it was formerly common. On the other hand, the western *C. c. occidentalis* inhabits the Pacific side of the Rockies from British Columbia and Vancouver Island to the north of California and New Mexico, and parts of Wyoming, especially the Jackson's Hole district. In the autumn of

1896 it was estimated that some 25,000 wapiti came down from the mountains to winter in the district south of the Yellowstone Park. Wapiti-shooting in these districts closes on December 1. Wapiti, as mentioned above, are like elk and reindeer, common to the Old World, but the other New World deer belong to the American genus *Mazama* (inclusive of *Dorcelaphus*, or *Odocoileus*). Foremost among these is the widely spread white-tailed deer (*Mazama americana*), of which the Virginian race, ranging over Eastern North America typically from Maine to the Gulf of Mexico, is the most familiar. In the Western States it is replaced by *M. a. macrura*, while in Florida its place is taken by the small *M. a. osceola*, and numerous other small forms occur in Mexico and Central America. Very distinct is the mule-deer (*M. hemionus*), whose range embraces suitable districts to the westward of the Missouri, from British Columbia to southern California. The allied but smaller black-tailed deer (*M. columbiana*), which also extends from British Columbia to California, but is confined to a narrow belt near the coast, is the only other species likely to interest the sportsman. In America the name "antelope" is commonly applied to the remarkable ruminant known in Europe as the prong-buck, or prong-horn (*Antilocapra americana*), which is generally regarded as representing a family by itself, and is characterised by the forked horn-sheaths being shed and replaced annually. Prong-buck are still numerous on the great prairies that touch the Rocky Mountains, as well as in Sonora and north Mexico, and extend northwards to the confines of Canada. Their proper home is, however, Sonora and Arizona, and they belong to a fauna somewhat different from that of the northern United States.

Of North American Carnivora other than those mentioned under the heading of Arctic America, the most formidable is the grisly, or grizzly bear (*Ursus horribilis*), the typical form of which ranges from Norton Sound, Alaska, through the Rockies to Utah; the Sonoran grizzly, of Mexico and California, being regarded by some naturalists as distinct. The so-called cinnamon bear seems to be merely a colour-phase of the grizzly. The American black bear (*U. americanus*), which has a wide geographical range, is, however, a distinct species, with several local races, of which the most remarkable is the so-called white bear (*U. a. kermodei*) of Gribble Island, British Columbia. The North American wolf (*Canis lupus nubilus*) has also a wide range; and mention may be made of the American race of the fox (*Canis vulpes fulvus*), of which the silver, or black, fox is a kind of sport, with fur of almost priceless value. A very distinct type is the grey fox (*Canis [Urocyon] cinereo-argentatus*).

The largest American representative of the cat tribe is the puma (*Felis concolor*), commonly known as the "lion," "panther," or "painter," which inhabits most parts of the United States, although more numerous in some districts than in others. In parts of Wyoming, as well as in Colorado and Utah, pumas were still common a few years ago. They were then hunted with hounds, but could only be obtained with certainty during the early spring and late autumn. Three a week was an average for a pack during the season, but sometimes three or four were killed in a day. The Canada lynx (*Felis lynx canadensis*) is a race of the Old World species inhabiting the northern wooded districts, but replaced in Colorado, Utah, and Arizona by the plateau race (*F. l. baileyi*). On the other hand,

the more southern bay lynx (*F. rufa*) is a distinct species.

Fur-bearing animals of the weasel tribe are exceedingly numerous in the northern districts of America. Among these, the glutton, or wolverine (*Gulo luscus*), from the wooded districts of Canada, is not separable from the European species. The martens are represented by *Mustela americana*, nearly allied to the pine-marten of Europe; but the pekan, or fisher-marten (*M. pennanti*), ranging from Alaska to Texas, is very distinct. Among smaller kinds may be mentioned the black-footed polecat (*M. nigripes*), and the American ermine (*M. erminea richardsoni*). The two well-known skunks (*Mephitis* and *Spilogale*) are characteristic American animals with beautiful fur; and mention must likewise be made of the American badger (*Taxidea americana*), belonging to a genus apart from the Old World species, with fur of considerable value. Another valuable fur-bearer is the American otter (*Lutra canadensis*); while raccoons (*Procyon*) and cacomistles (*Bassariscus*) are among the most characteristic of American fur-producers, easily recognised by the alternate dark and light rings on their tails. This list of North American mammals of sport must close with the Canadian beaver (*Castor fiber canadensis*); but the opossum (*Didelphys marsupialis*), as being the sole North American marsupial, cannot be passed over without mention.

Game-birds and water-fowl are so numerous in North America, that it is impossible to mention all. In regard to duck, geese, etc., Dr. D. G. Elliot observes that "North America at one time probably contained more wild-fowl than any other country of the globe, and even in the recollection of some living the birds

came down from the northland during the autumn in numbers that were incredible, promising a continuance of the race for ever. I have myself seen great masses of ducks, and also of geese, rise at one time from the water in so dense a cloud as to obscure the sky, and every suitable water-covered spot held some member of the family throughout our limits. But those great armies of wild-fowl will be seen no more in our land, only the survivors of their broken ranks." The names of a few of the more northern species have been already mentioned under the heading of Arctic America, and it must suffice to add that a total of over sixty species and races are recognised, among which several, such as the mallard and the gadwal, are identical with the European birds. The most celebrated from a gastro-nomic point of view is the canvas-back duck (*Aristonetta valisneria*), while the largest is the trumpeter-swan (*Cygnus buccinator*).

Among game-birds and snipe, the three most important in the eastern United States are the ruffed grouse (*Bonasa umbellus*), the Virginian quail, or "Bob White" (*Ortyx virginiana*), and the American woodcock (*Scolopax minor*). The list also includes the Canada grouse (*Canachites canadensis*), which ranges as far south as New York, Franklin's grouse (*C. franklini*), from the west of the Rockies, the three kinds of so-called American capercaillie (*Dendragapus*), the prairie-hens (*Tympanuchus*) and sage-grouse (*Centrocercus*), the three species of sharp-tailed grouse (*Pediacetes*) and the hazel-hens (*Tetrastes*). As guinea-fowls are exclusively African, so turkeys are characteristically American in the wild state; and of these, the typical *Meleagris gallopavo* comes from the table-lands of northern Mexico and the neighbouring states, while

in the Eastern States it is replaced by *M. americana*. By far the most beautiful species is, however, the Central American *M. ocellata*, from Guatemala, Yucatan, and British Honduras. There are numerous relatives of the "Bob White," such as the scaled partridges (*Callipepla*), the mountain-partridge (*Oreortyx pictus*) from the Western States, the Californian quail (*Lophortyx californicus*), and the species of *Cyrtonyx*, which extend from the South-western States into Central America. It may be added that pheasants have been introduced and acclimatised into several of the States. Snipe are represented by Wilson's snipe (*Galinago wilsoni*).

In other groups of birds, it may be mentioned that the red flamingo (*Phœnicopterus chilensis*) ranges into the warmer States of North America; while among the diurnal birds-of-prey are the American osprey (*Pandion haliaëtus carolinensis*), the golden eagle (*Aquila chrysaëtus*), and the white-headed sea-eagle (*Haliaëtus leucocephalus*). The harpy eagle (*Thrasaëtus harpyia*), the sole member of its genus, is found in the forests of Texas and Mexico; and the ivory-billed woodpecker (*Campophilus principalis*) is also a native of southern North America. The American vultures constitute a family (*Cathartidæ*) quite distinct from the one in which the Old World vultures are grouped; and representatives of the South and Central American group of humming-birds (*Trochilidæ*) extend as far north as the southern States of North America.

The Mississippi is the home of the typical alligator (*Alligator mississippiensis*); the second species of the same genus occurring, as already mentioned, in the Yang-tsi-kiang. The great snapping-turtles of the family *Chelydridæ* are now exclusively North American; and the same is the case with the two species of poisonous

lizards (*Heloderma*), of which one inhabits Mexico, and the other New Mexico and Arizona. Rattlesnakes (*Crotalus* and *Sistrurus*) are likewise American types, ranging as far south as Argentina. In the possession of a giant salamander (*Cryptobranchus alleghaniensis*) North America presents a feature in geographical distribution parallel to the case of the alligator, the second species (*C. japonicus*) occurring in the rivers of Japan and China.

Like those of Arctic America, the streams of the Western United States abound in Pacific salmon (*Oncorhynchus*); and wonderful sport can be enjoyed by the angler in many parts of North America, although the species cannot here be particularised. Reference may, however, be made to fishing for tarpon, or king-herring (*Megalops thrissoides*). This fish may weigh as much as a couple of hundred pounds, and measure about twelve feet in length, and its capture with rod-and-line affords, therefore, exciting sport, demanding the utmost skill of the angler. Tarpon-fishing in Florida is practised from boats, and the struggle will often last for hours.¹ Among fresh-water species, mention may be made of the bow-fin (*Amia calva*) and the mail-clad bony pike (*Lepidosteus osseus*), as survivors of ancient types.

CENTRAL AND SOUTH AMERICA.—Although Central and South America contain only a comparatively small number of animals coming under the designation of big game, yet they are of overwhelming interest to the naturalist, the greater number of their mammals and birds being unlike those of any other region. The area includes a great variety of climate, the Guianas and Brazil being some of the hottest countries in the

¹ See *The English Angler in Florida*, by Rowland Ward.

world, whereas for the greater part of the year the climate of Argentina is delightful, while Patagonia in winter is very cold indeed. For a yachting voyage, so arranged that excursions can be made inland from different ports, this part of the world presents exceptional advantages. In the forests of Brazil and the neighbouring countries dogs are necessary for the larger game, which are scarcely ever seen by the ordinary traveller in the primeval forest. When natives are sent into the forest with dogs, they put up various animals which almost invariably take to the nearest river, where the sportsman is in waiting, and gets his shot as they swim. Peccaries, however, do not take to the water, and are followed till brought to bay by the dogs. On the other hand, in the open plains of Argentina, as well as in Patagonia, shooting is done on horseback, the horses being so trained as to stand immovable while the sportsman dismounts for his shot.

Among Carnivora, the puma (*Felis concolor*), of which there are several local races, ranges throughout the area, being especially numerous in parts of Patagonia; and the jaguar (*F. onca*), the *tigrè* of the Spanish colonists, is also widely distributed, and very abundant in Paraguay and the Matto Grosso district of Brazil, where remarkably fine specimens are met with. Black jaguars are by no means uncommon. Of the smaller cats, the ocelot (*F. pardalis*) displays extraordinary variation in its handsome colouring; there is also the mongoose-like and uniformly-coloured jaguarondi (*F. jaguarondi*), and farther south the long-haired pampas cat (*F. pajeros*). The red wolf (*Canis jubatus*) is a large and peculiar species ranging from Brazil to Argentina; and there are numerous smaller species commonly

called foxes, such as *C. azaræ*, *C. magellanicus*, and *C. thous*, while in the Falkland Islands there was a wolf-like species, *C. antarcticus*. Specially interesting is the bush-dog (*Speothos venaticus*), of the Guianas and Brazil, which, with an allied species in Ecuador, forms a peculiar generic type. The spectacled bear (*Ursus ornatus*) of the Chilian Andes represents, on the other hand, a widely spread genus. Among smaller Carnivora, the Brazilian otter (*Lutra brasiliensis*) is the largest of its tribe, while the grison and tayra (*Galictis* and *Galera*) are peculiar South American types. The South American skunks (*Conepatus*) are likewise markedly different from their northern relatives; and the coatis (*Nasua*) are restricted to this area.

All the above were originally immigrants from the north; but the following belong to the indigenous South American fauna.

The forests of Guiana and Brazil abound with monkeys—among which the spider-monkeys (*Ateles*) are some of the most familiar, while the howlers (*Alouatta*, or *Mycetes*) take their name from their nocturnal choruses. These monkeys are widely distinguished from their relatives of the Old World; but the most remarkable of South American mammals are sloths (*Bradypus* and *Cholæpus*), ant-eaters (*Myrmecophaga*, *Tamandua*, and *Cyclopes*), and armadillos (*Dasypus*, *Tatusia*, *Priodon*, etc.), the two former being confined to the hot forest-districts, while the latter (which many persons regard as reptiles) are met with everywhere. The rodents likewise present numerous peculiar types, the carpincho, or capibara (*Hydrochærus capibara*), of the rivers of Brazil and Uruguay, being the largest member of the entire group. The coypu, or nutria (*Myopotamus coypus*), is another aquatic type with a wider

range. In the warmer forests are agutis (*Dasyprocta*) and pacas (*Cælogenys*), but the valuable chinchillas (*Chinchilla* and *Lagidium*) are confined to the higher Andes. The tree-porcupines (*Synetheres*) form another South American group confined to the forest districts. On the Argentine pampa the warrens of the viscacha (*Lagostomus trichodactylus*) form conspicuous objects; and in south Argentina and Patagonia the mara, or Patagonian cavy (*Dolichotis patagonica*), may almost be regarded as a feature in the landscape.

Far greater attraction to the sportsman is, however, afforded by the species of deer peculiar to Central and South America, which, however, like the other animals mentioned in this paragraph, are of northern origin. These include several small races of the white-tailed deer (*Mazama americana*), ranging from southern Mexico to Peru; the handsome red-and-black marsh-deer (*M. dichotoma*) of Brazil, Paraguay, and northern Argentina, and the smaller but allied pampas deer (*M. bezoartica*) of Argentina; the two species of guemal (*M. antisiensis* and *M. bisulca*) from the Andes and Patagonia; the numerous small species of brockets (*M. nemorivaga*, *rufa*, etc.), which form the typical representatives of the genus, and range from Central America to Paraguay; and lastly the pudu (*Pudua pudu*) of the Andes, which is the smallest of all deer. The guanaco (*Lama guanacus*) and the vicugna (*L. vicugna*), the wild representatives of the domesticated alpaca and llama, are peculiar South American ruminants, ranging from the Andes of Peru and Bolivia to Patagonia, and in the latter country affording good sport with hounds. Peccaries (*Dicotyles*), which range north to Texas, represent the pigs. Of tapirs, the Brazilian *Tapirus americanus* is found in the lowland forest-districts,

while others inhabit the mountains. Although of large size, these animals, from the absence of horns or tusks, afford no satisfactory trophies to the sportsman.

Among birds, the rhea, or American ostrich (*Rhea americana*), abounds on parts of the Argentine pampas and in Patagonia, where it may be hunted with dogs, or taken by means of the bolas or lasso. Of the birds-of-prey, the largest is the condor (*Sarcoramphus gryphus*) of the Andes, most abundant in Bolivia, Peru, and Chile. Very characteristic of Central and South America are the long-legged hawks known as caracaras and chimangos (*Polyborus* and *Ibycter*), of which there are numerous representatives in different parts of the country. The red flamingo ranges from Brazil to Argentina; and the great jabiru stork (*Mycteria americana*) is generally distributed in the neighbourhood of lakes and swamps. Similar localities in the Guianas and Brazil form the haunts of the horned screamer (*Palamedea cornuta*), whose place is taken on the *lagunas* of Argentina by the chaja, or crested screamer (*Chauna chavaria*). In winter the same lagunas abound with ducks of various kinds; and on the pampas the different kinds of tinamus (*Tinamidae*), locally known as "partridges" and "pheasants," afford excellent sport with the shot-gun, the largest species being the martinetta (*Rhynchotus rufescens*), whose wailing whistle is a characteristic sound on the silent pampa.

Another remarkable South American bird is the long-legged seriema (*Cariama cristata*), abundant on the plateaus of Brazil, but also found less commonly in Paraguay; and the hoatzin (*Opisthocomus cristatus*), whose young climb by the aid of the claws on their wings, is perhaps even more noteworthy. Although also met with in the southern United States, those

great black game-birds known as guans and curassows (*Cracidae*) attain their maximum development in the southern half of the New World. The lovely orange cock-of-the-rock (*Rupicola croceus*), formerly abundant in the Guianas, and its relatives are some of the most gorgeous of all birds ; while the toucans (*Rhampastidae*) attract attention on account of their enormous and brilliantly coloured beaks. Several species of the exquisite manakins (*Pipra*), as well as the gorgeously coloured fruit-eaters or chatterers (*Cotinga*), inhabit the forests of Brazil and the Guianas. These countries, together with the tropical districts generally, also form the true home of the great tribe of humming-birds (*Trochilidae*), which are most abundant about marshy deltas and the banks of rivers, although a few are restricted to the extinct volcanic craters of the high Andes. Finally, thousands of gorgeous macaws (*Ara*, etc.), as well as various kinds of parrots and paraquets (*Conurus* and *Amazona*), inhabit the teeming forests of Brazil and the Guianas, extending also into the warmer zones of the Andes.

The alligator of the Mississippi is replaced in the warmer rivers and lakes of South America by numerous species of the caimans (*Caiman*), distinguished by the presence of bony plates on the under as well as on the upper surface of the body. The river-tortoises of South America belong to the southern side-necked group (*Pleurodira*), and have their nearest relatives in Madagascar. The largest is the great Amazonian *Podocnemis expansa*, with a shell of fully a yard in length ; but the most curious is the matamata (*Chelys fimbriata*), whose flattened head and neck are adorned with fringe-like appendages, apparently serving to lure prey. The huge anaconda (*Eunectes murinus*) and the boa

(*Boa constrictor*) are characteristic South American snakes ; the latter species and its relatives being, like the water-tortoises, represented by allied types in Madagascar.

The warmer rivers and swamps of the country are the home of the South American lung-fish (*Lepidosiren paradoxa*), whose nearest relatives, *Protopterus annectans* and two other species of the same genus, are inhabitants of the fresh-waters of Equatorial Africa.

A large proportion of the fresh-water fishes of South America belong to the family of cat-fishes (*Siluridæ*), most of which are dangerous to handle on account of the wounds inflicted by the pungent spines on the back. Special mention must be made of the arapaima (*Arapaima gigas*), of the rivers of the Guianas and Brazil, on account of its being the largest of all fresh-water fish ; specimens having been captured whose length reached fifteen feet, and their weight some 400 pounds.

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SCENE FROM THE COLONIAL AND INDIAN EXHIBITION, 1886.
TROPHY OF INDIAN ANIMAL LIFE, BY ROWLAND WARD.



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